Reseal ching Latin America markets?

Here are some pointers . . . page 38

**Gas Chromatography Eliminates** Potential Air Pollution Problem . . 140

FOR THE CHEMICAL MANAGEMENT TEAM PROCESSING 8

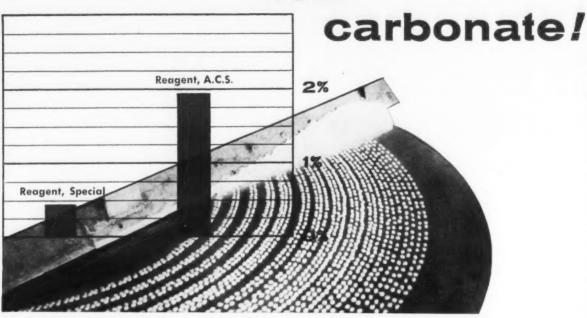


.. support the Harris-O'Hara bill..." ... urges R. C. McCurdy, Shell Chemical president.

> Chemical industry has much at stake in this controversial natural gas legislation.

> > . . . page 25

# special low



# B&A expands production of pelletized REAGENT SODIUM HYDROXIDE

B&A was first to offer a special low carbonate sodium hydroxide pellet. Now, in response to increased demand, it has installed a unique new plant at Marcus Hook, Pa., for production of its pelletized reagent grade products.

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B&A offers two grades of reagent sodium hydroxide pellets: Reagent

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Nitrogen Compounds (as N)0.001%
Phosphate (PO <sub>3</sub> )
Sulfate (SO <sub>4</sub> )
Ammonium Hydroxide
Precipitate0.020%
Heavy Metals (as Ag)0.002%

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Assay (NaUH)	7
MAXIMUM LIMIT OF IMPURITIES	
Sodium Carbonate (Na <sub>2</sub> CO <sub>3</sub> )2.0	9
Chloride (CI)0.00	
Nitrogen Compounds (as N)0.00	19
Phosphate (PO <sub>4</sub> )0.00	19
Sulfate (SO <sub>4</sub> )0.00	
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that's interesting

#### How thick is stardust?

Measuring stardust—micro meteorites in outer space-will be the job of a ½"-width with the skin of the Earth Satellite. As the tiny bits of matter pit the strip, electrical is sistance increases. The increase will be signaled betto earth. (D-H Alloy Craftman, Driver-Harris Co.)

#### Picture on a plate

The production of images of flat panels by combining electro-luminescence and photoconductance has been demonstrated by Sylvania Electric Products, Inc. Reproduction of pictures in motion is possible. Although development may hold answer to picture-on-the-wall television, company is restricting attention to national defense applications and specialized commercial and industrial fields.

#### A plastic future

Plastic production volume has increased more than 400%, since end of World War II, and there doesn't seem to be an end to uses. Polyethylene is being used for shotgun shells. Vinyl irrigation dams



"No we haven't gone that far yet! She's just repairing the press".

that can be folded up and carried are now available, and some 1958 cars will ride on synthetic fabric bellows instead of metal springs.

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Standard outfit for a new kind of scientist includes long woolen underwear; neoprene shirt, pants, headgear, and socks; a lead-weighted belt, and flippers. Frogmen geologists dive into the Pacific to study folds and faults in underwater strata in search of petroleum. Is wet chemistry making a comeback? (The Laboratory, Fisher Scientific

#### from another world



"Sorry fellows, the science fiction class doesn't start for ten minutes yet."

Members of a unique creativity class at Esso Research and Engineering Co., were required to dream up new planets, and people them with beings completely unlike humans. Each "race" had to be explained as a logical development of planets physical characteristics. Purpose was to encourage scientists to use their creative talents to the fullest. The News, Esso Research & Engineering)

#### A strong foundation

Over 2000 cubic yards of concrete were poured, continuously, as a foundation for Kaiser Steel Corp.'s new blast furnace. Pour was finished in seven hours and seven minutes, utilized 49 transit-mix trucks, and 13,200 sacks of ce-

Turn to next page

what happens to your dust?



Kentile, Inc., found a Dracco Multi-Bag Filter to be the ideal solution to air pollution problems created by an inadequate cyclone-type collector. Filter collects  $\sqrt{2}$ -ton of dust daily from processing of Kentile Cork Tile.

If your dust is being exhausted to the atmosphere, you may be wasting valuable materials . . . or violating air pollution ordinances.

But if it's being collected by a Dracco Multi-Bag Filter, you can breathe easy. Dracco Filters collect 991/2-100% of all dust particles and exhaust only clean air with no visible dust to the atmosphere.

Kentile, Inc., Brooklyn (N. Y.) installed a Dracco Multi-Bag Filter to

Dracco today.

avoid trouble with city officials. An old-style cyclone-type collector was being used to collect dust from cutting, slitting, grinding and finishing operations in the production of Kentile Cork Tile for walls and floors. Larger particles were being trapped, but fine dust-over half-a-ton a day-was escaping. By installing a Dracco Filter engineered to exact job requirements, Kentile now prevents air pollution. Dusty air is carried from the cyclone through a large pipeline into the heart of the filter, collected in the hoppers and bags, then automatically discharged for convenient disposal.

If your plant is polluting the atmosphere with dust, or if you have any other dust problems, check with Dracco for a cost-saving switch from problems to profits.

DRACCO CORPORATION 4070 East 116th Street - Cleveland 5, Ohio

Bulletin 800 is Dracco's 40-page catalog on dust control and recovery. Contains detailed facts and figures on all dust control equipment. For your copy, write

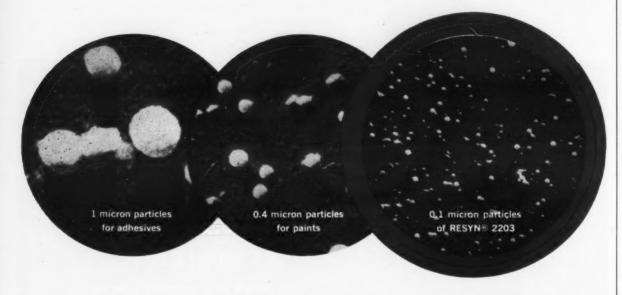


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#### ANNOUNCING

# VINYL-ACRYLIC

COPOLYMER LATEX



# a further refinement in particle size

RESYN 2203 is a new vinyl-acrylic latex with particles that average 0.1 of a micron in size. Many times smaller than those of vinyl acetate emulsions.

This refinement in particle size greatly increases surface area. As can be seen from the microphotographic comparison. Greater binding power results. Film clarity increases. Water resistance also improves.

RESYN 2203 is internally plasticized. Films are glossy and exhibit good strength and flexibility. Some promising uses: coating for paper, leather finishing, binder for nonwoven fabrics. Like to investigate? Write for a sample and data sheet.

RESIN DIVISION



270 Madison Avenue, New York 16 • 3641 So. Washtenaw Avenue, Chicago 32 • 735 Battery Street, San Francisco 11

Check 1003 opposite last page.

#### THAT'S INTERESTING

#### Brain on a tape

Shades of science fiction! Practicality of automatic machine tools operated by magnetic tape for production line use has been established. Magnetic tape serves as a "memory system" for machines. A complete "program" of instructions can be recorded and then played back to control machines automatically.

#### **Battery TV**

A cathode-ray tube that will enable television receiver designs to operate from batteries



has been developed by Milti-Tron Lab., Inc. of Chicago. It permits direct operation from diode or transistor output. (Electronic Design)

#### Applied solar energy

Solar cigarette lighters are now on sale at Abercrombie & Fitch. Lighter has a parabolic aluminum reflector which concentrates sun's rays onto tip of the cigarette. (The Sun at Work, Association for Applied Solar Energy)

#### Fluid stays fluid

A coolant-dielectric which remains pumpable from -65 to 400°F is now available from Monsanto. Silicate esterbased fluid called OS-45 has good lubricity and dielectric strength, excellent heat transfer properties.

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with which is combined CHEMICAL PROCESSING PREVIEW and Chemical Business

#### For the management team

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October 1957

No. 10

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This issue of CHEMICAL PROCESSING magazine distributed to more than 47,000 members of the Management Team, wherever chemicals and chemical processes are involved:

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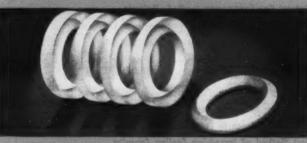
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OF THE GARLOCK PACKING COMPANY

Check 1004 opposite last page.

# chemical

# highlights

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places Richard C. McCurdy, President of Shell Chemical Corp., against a backdrop of a swiftly growing portion of the chemical industry -chemicals produced from natural gas. Beginning on page 25, Mr. McCurdy discusses how the outcome of the current natural gas con-troversy could affect the chemical industry.



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• To subscribe to this magazine, see reader-qualification form opposite last page

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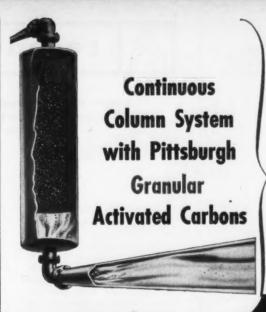
The three Princes of Serendip, according to legend, were constantly making valuable but quite unexpected discoveries of things that they weren't really looking for . . . hence the word serendipity. There are times, too, when work of others in unrelated fields can open the door for us in solving our problems. For example, the spinneret now used in production of modern synthetic filaments was first developed during investigation of a way to make filaments for light bulbs.

When you read the "That's Interesting" column at the start of each issue, we hope that you find there an idea, product, or happening that will stir your imagination. In the case of the management team at Esso Research and Engineering, a unique method has been devised to stimulate creative thinking (see page 2). Perhaps, the things you'll find in the TI column can serve the same purpose for you.

We hope that you will approach the topics touched on briefly in "That's Interesting" with an inquiring mind. Perhaps even as Galileo observed the steam-kettle cover and formulated the groundwork for jet propulsion, there are new fields of endeavor just waiting for a lift of the lid.

Theodore It. Hely

Assistant Editor



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### recent books

reviews of current technical and reference work . . . summarized for you by authorities in the field with the CP staff

#### Semimicro Qualitative Organic Analysis

This thorough treatise describes a system for the identification of organic compounds. It has been enlarged by 250 pages over the previous edition, so that the total is now 774 pages.

The authors, Professors Nicholas D. Cheronis of Brooklyn College and John B. Entrikin of Centenary College of Louisiana, have described many procedures embodying new techniques such as those found in paper chromatography and ion exchange. They've included the preparation of many new derivatives and enlarged the section on physical constants.

In addition to this 191-page table of constants, the book is divided into three parts: a discussion of the apparatus and techniques of organic analysis and detailed procedures for both the tentative and positive identification of an unknown.

Each part is divided into a number of sections each of which is followed by many practical exercises and thorough references.

To obtain "Semimicro Qualitative Organic Analysis" remit \$9.00 direct to Interscience Publishers, Inc., Dept. CP, 250 Fifth Ave., New York 1, N.Y. When inquiring specify 1007 opposite last page.

#### Instrumental Analysis

Many of the most important methods of instrumental analysis are not discussed in physics and physical chemistry courses. Author Paul Delahay's book is intended to remedy that deficiency, allowing presentation of a course at either graduate or undergraduate level. However, the author has written his book so as to be of value to the analyst as well as the student.

Discussions are included on X-ray methods, mass spectrometry, nuclear radiation techniques as well as the more used methods of potentiometry, polarography, emission spectroscopy, and absorption spectrometry. Theoretical discussions are quite elementary. Basic electrical and optical diagrams are given, but block diagrams are utilized to represent electronic circuits. Most chapters of the 384-page volume contain problems dealing with extension and application of theory. Bibliographies are also given in most chapters. Special attention is given to descriptions of laboratory work. More than fifty experiments are described in twenty-three sec-

To obtain "Instrumental Analysis" remit \$7.90 direct to The Macmillan Company, Dept. CP, 60 Fifth Avenue, New York 11, N. Y. When inquiring check 1008 on form opposite last page.

#### Quality Control and Statistical Methods

Reviewed by HERBERT ZIEBOLZ Chief Engineer Askania Regulator Company

In spite of the ever increasing number of technical books on specialized engineering problems, it becomes more and more seldom that one finds a book like that of Mr. Edward Schrock which not only covers the subject, but also lets the reader participate

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in the enthusiasm of the author.

This is a remarkable book indeed, clearly written and full of personal remarks which show that its author does not only know his subject well, but also the psychological problems connected with the practical introduction or application of quality control in an industrial plant.

There are, an unusual but refreshing breath of approach, not only quotations from Tolstoy, but also recommendations on how to answer inquiries of people interested in how to gamble.

The book can be recommended to any engineer or student or manager who wants to have a clear idea of what quality control is, how it works, why it is successful, what its limitations are and last but not least, how to introduce it to a team. It asks questions which will occur to the reader and some which will not and answers these with specific explanations.

There are new chapters on rapid tests of significance and the analysis of variance. One practically joins the author in his training efforts and has the rare experience of participation which only an unusual personal ability of the instructor can convey.

'I do not know in this area of any book I would as unhesitatingly recommend to those interested to learn about the potential of quality controls as the one of Mr. Schrock — its clarity is by no means the result of popularization but of a thorough knowledge of the subject and its communication to others.

To obtain "Quality Control and Statistical Methods" remit \$6.75 direct to Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

#### Nuclear Reactor Physics

This 317-page book is designed for use by graduate science or engineering students and design engineers in nuclear field. Written by Raymond L. Murray, Professor of



FOR EXAMPLE:

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On free filtering materials you have the advantage of full employment of vacuum directly under the filter medium, low internal pressure drop and completely unhampered flow of filtrate. This means a drier cake as well as maximum capacity.

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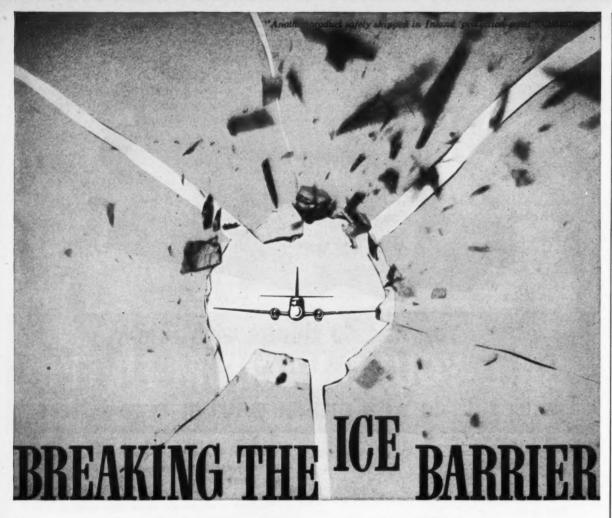
You save real money on both installation and operating cost. Space requirements are minimum. No filtrate receivers. Cost per ton or per gallon, including maintenance, is exceptionally low.



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Check 1009 opposite last page.



Ice on airliner wings is dangerous. To eliminate this hazard, Kilfrost TKS R328 wing de-icing fluid, made by Chipman Chemical Co., Inc., is extensively used for both commercial and private airplanes. The fluid is circulated through a honeycomb surface along the wing's leading edge. The flow of Kilfrost over the wing's surface, controlled by the pilot, forms a film that dissolves ice on contact—preventing its formation in flight.

Foreign particles in this fluid, however, could clog the honeycombed surface, jamming the circulatory system. Kilfrost has to be delivered in perfect condition, pure and contamination-free.

Various types of packaging materials were tried but the abuse received during shipment caused leaks at corners and seams. So Chipman and Inland made exhaustive tests and found the answer in a sturdy Inland steel pail with a special protective lining. Now Chipman has a package they can depend on to deliver Kilfrost safe, uncontaminated, ready to break the ice barrier.

Wherever *your* products are used—land, sea or air—if packaging is a problem, Inland Steel Container is ready to help you. Write Bob Boecher, Dept. 334C.

Physics, North Carolina State College of Agriculture and Engineering, it provides an introduction to the methods of analysis of reactor design and cites numerical example drawn from practical situations in reactor design.

Material is based on course given by author since 1950 in the Nuclear Engineering curriculum at North Carolina State College. Emphasis is placed on distributions in energy and space of neutron flux, determination of critical amount of fissionable materials, and the transient behavior and control of the reactor as a heat source.

Theory is presented simply and logically. There are about 100 problems, with answers provided. Book is adequately illustrated with charts, graphs, and drawings (no photographs). List of selected references and an appendix providing Bessel function formulas are included.

To obtain "Nuclear Reactor Physics" remit \$10.00 direct to Prentice-Hall, Inc., Publishers, 70 Fifth Avenue, New York 11, N. Y.

Check 1011 opposite last page.

# Solvent Extraction in Analytical Chemistry

Solvent extraction is a powerful separation technique of the modern analytical chemist. It permits an increase in analysis speed, is applicable to trace concentrations, and can be used in highly complex mixtures.

an

This 270-page book by Drs. G. H. Morrison and H. Freiser is divided into four parts. The first, and longest, blankets solvent extraction principles. Methods and techniques, and the apparatus required, are discussed in second part.

Extraction systems — ion association and chelate systems — are surveyed in the third part of the book. The fourth part presents a representative selection of extraction methods for 66 elements. Physical constants of 107 organic solvents are given in the appendix.

The book is of handy size



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for lab use, is thorough, and is well-indexed and organized. It is the first comprehensive treatment of this new and important technique.

To obtain this book, remit \$6.75 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y.

Check 1013 opposite last page.

#### Fundamentals of Chromatography

This 447-page book by Harold Gomes Cassidy is the latest (Volume X) in the series, "Technique of Organic Chemistry." It is the outgrowth of two chapters in Volume V (of this series) dealing with chromatography in broad context of adsorption.

In Volume X, the author approaches chromatography on level of principle, using appropriate illustrations to point out applications. Instead of approaching the subject through detailed reviews of methods, he has stuck with the "how" and "why" to present a homogeneous treatment of the entire field of chromatography.

Appendix lists sources of chromatography equipment and 1042 literature references.

To obtain "Fundamentals of Chromatography" remit \$9.75 direct to Interscience Publishers, Inc., Dept. CP, 250 Fifth Ave., New York 1, N.Y. Check 1014 on form opp. last page.



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# Polyken Protective Coating keeps this conduit safe from corrosive attack of chemically treated water

Rugged Polyken Tape has prevented corrosion damage here since 1951

The conduit pictured above is installed on a water cooling tower serving one of the world's largest fluid catalytic cracking units at Gulf Oil's Port Arthur, Texas Refinery.

If it were unprotected, the conduit would soon be destroyed by corrosion. But Polyken Protective

Tape Coating has been on the job for 6 years, providing dependable protection. What's more, *Polyken* Tape shows no sign of deterioration.

Polyken Protective Coatings are tough plastic tapes. They're manufactured from controlled raw materials under controlled conditions. They offer high resistance to corrosive atmospheres at varying temperatures. Thickness and composition of the polyethylene backing and adhesive mass are consistent.

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To talk over your project—write, wire or phone *Polyken Sales Division*, 309 W. Jackson Blvd., Chicago 6, Illinois. Webster 9-7100.

Complete catalog, Sweet's Industrial Construction File, Sec.  $\frac{3J}{K_0}$ 

Check 1015 opposite last page.



conventions and exhibits

October 8. Synthetic Organic Chemical Manufacturers Association, luncheon meeting, Hotel Roosevelt, New York.

October 15-18. Scientific Apparatus Makers Association, midyear meeting of Recorder-Controller Section, Seaview Country Club, Absecon, N. J.

October 20-23. Scientific Apparatus Makers Association, midyear meeting of Industrial Instrument Section, Grand Hotel, Point Clear, Alabama.

October 21-25. National Metal Exposition, Chicago.

October 21-25. 45th National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago.

October 22. American Society of Safety Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

October 23-24. Computer Applications Symposium, sponsored by Armour Research Foundation, Hotel Sherman, Chicago.

October 28-31. The National Industrial Packaging & Handling Exposition, Convention Hall, Atlantic City.

October 28-31. American Nuclear Society, second winter meeting, Henry Hudson Hotel, New York.

October 30-November 2. Federation of Paint and Varnish Production Clubs, 35th annual meeting, Bellevue Stratford Hotel, Philadelphia.

October 31. Technical Conference on Reactor Safety, sponsored by AEC, Atomic Industrial Forum and American Nuclear Society, New York.

November 2-8. Second World Metallurgical Congress, sponsored by American Society for Metals, International Amphitheatre, Chicago.

November 4-6. National Paint,

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Varnish and Lacquer Association, annual convention, Sheraton Park and Shoreham Hotels, Washington, D.C.

November 11-14. American Petroleum Institute, meeting, Conrad Hilton Hotel, Chicago.

November 12. Synthetic Organic Chemical Manufacturers Association, luncheon meeting, Hotel Roosevelt, New York.

November 12-14. National Association of Corrosion Engineers Northeast Region, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

November 13-14. Air Pollution Conference, co-sponsored by Armour Research Foundation and Midwestern Air Pollution Prevention Association, Chicago.

November 14-16. The American Society of Refrigerating Engineers, semi-annual meeting, Shoreland Hotel, Chicago.

November 18-21. Air-Conditioning and Refrigeration Institute, Tenth Exposition, International Amphitheatre, Chicago.

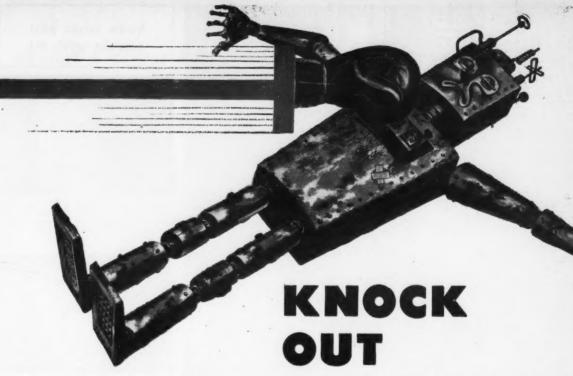
November 20-21. Chemical Market Research Association and Commercial Chemical Development Association, joint meeting, Houston, Texas.

November 26. Manufacturing Chemists' Association, Seventh Semi-annual Meeting and Winter Conference, Statler Hotel, New York.

December 1-6. The American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin Hotels, New York.

December 2-6. 26th Exposition of Chemical Industries, Coliseum, New York.

December 8-11. American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.



Alkaterge-T is fulfilling its early promise of being an exceptional oil-soluble corrosion inhibitor. It passed two commonly used screening tests with the most gratifying results and industrial users are finding confirmation in practice.

At least part of its success is probably due to its very powerful adhesion to metallic and other hydrophilic surfaces. The force required to break this adhesion has been measured at 10,500 psi — highest of any compound tested. Alkaterge-T is a big molecule and with this adhesion, powerful protection would be expected by most corrosion engineers. But Alkaterge-T has a plus value, too. Mildly alkaline, it will tie up any trace of acidity that may develop, yet it is harmless to brass. This product, therefore, should be evaluated by every manufacturer of rust preventive oils, lubricants, cutting oils, extruding oils, transformer oils, corrosion resistant greases, and spinning and throwing oils for the textile industry.

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Check 1016 opposite last page.



# New polyester film takes heat-seal!

Now you can have all the advantages of packaging in tough polyester film — plus heat sealing — with "Scotchpak."

This remarkable polyester film takes a seal as tough as the film itself — and easily: A temperature of 275° to 375°F. and 20-60 psi is

"Scotchpak" Brand Heat-Sealable Polyester Film gives you a packaging material with a high degree of inertness and resistance to extreme temperature conditions. It also protects against solvents, chemicals and moisture - yet has high tensile strength.

Here is a versatile packaging film. Manufacturers of such varied products as cosmetics, acids, syrups, silverware, oils, greases, adhesives, asphaltics, catsup, mustard and surgical dressing will find it ideal. It can even be used as a container liner or insulation pillow.

For complete information, write for folder described at right.

# SCOTCHPAK"

HEAT-SEALABLE POLYESTER FILM

The term "SCOTCHPAK" is a trademark of Minnesota Mining and Manufacturing Company, St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N. Y. In Canada: P.O. Box 757, London, Ontario. © 3M Co., 1957.



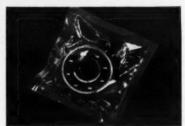
#### Look what you can do with it!



LIQUIDS, semi-solids, and solids can be packaged easily, halidled safely, shipped without fear in heat-sealable containers of new "SCOTCHPAK" Poly-



FOOD ITEMS are packaged safely in clearas-glass "Scotchpak" Film. Contents can be frozen . . . even boiled right in the package. Low gas penetration rate . . . inert and non-toxic



METAL PARTS can be packaged dry or in oil or grease to protect them against corrosion. Transparent packages are easy to handle, easy to ship and to store. Simplifies issuing of parts and units.



FREE FOLDER shows dozens of ways you can solve your most difficult packaging and shipping problems with new "Scotchpak" Polyester Film. Just write on your letterhead: Film Products Group, 3M Co., St. Paul 6, Minn., Dept. OL-107.



looking ahead to next month

Quick previews of some highlights in November Chemical Processing

#### Considering consumer markets?

If so, you'll be interested in what Henry H. Reichhold. president of Reichhold Chemicals, Inc., has to say about why he thinks a chemical company should not enter the consumer field. In this feature article. Mr. Reichhold describes how he was quite tempted to enter the phonograph record field about 10 years ago - and why he thinks his decision of "No" was a right one.

Admitting that the consumer market offers exciting benefits, Mr. Reichhold believes that it is wrong to enter into competition with your customers

#### Popular sodium phosphates how they're made

Spray-dried sodium phosphates, introduced only a few years ago, are rapidly making a name for themselves. Biggest use is in consumer detergents.



Shea Chemical operator R. B. Wilkins gives CP's Ted Meinhold some "inside" information about spray-dried TSPP

Associate Editor Ted Meinhold made a visit to Shea Chemical Corp., the company that first introduced spraydried phosphates commercially. Shea's process and products are described in story appearing in November.

Turn to page 15

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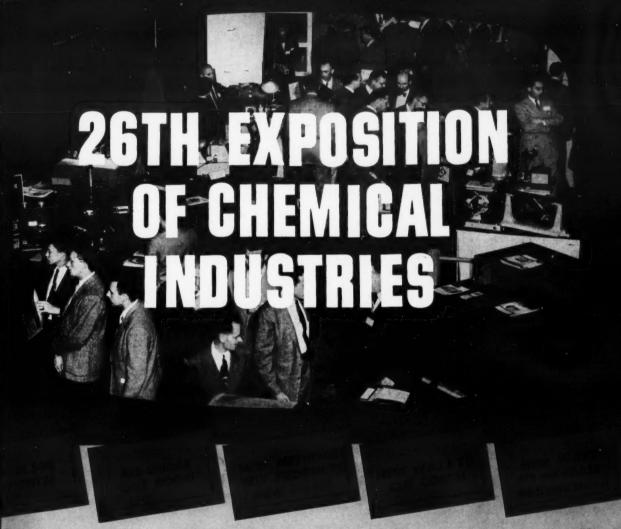
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What's New In
Chemical Progress
NEW YORK COLISEUM—DECEMBER 2-6, 1957



For the first time in six years, the greatest concentration of new and important developments in all phases of the Chemical Process Industries returns to New York City. All under one roof, you will see the results of the constant search for new processes, more efficient techniques, and improved product performance—new methods, new ideas, and new ways to cut costs, increase production.

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For your convenience, new sections have been established for displays of laboratory apparatus and supplies, chemicals and raw materials. This grouping will help you secure new and helpful information faster.

Check your calendar today and make a date with your executives, engineers, designers and chemists to come and see the hundreds of new and important developments which will make your visit to the 26th Exposition of Chemical Industries the most profitable investment you ever made.

it's AN OPPORTUNITY FOR YOU... to see for yourself "what's new" in your industry. Learn about modern developments and cost-saving techniques at the 26th Exposition of Chemical Industries. Make your plans now! Fill in and mail the coupon on the other side to be sure of your advance registration. No obligation, of course.

#### THESE NEW PRODUCTS WILL HELP YOU CUT COSTS AND INCREASE PRODUCTION

Abrasives Absorbers Acida Acidiflare **Acid Resisting** Agitators Air Conditioning Apparatus Alkalies Alloys Anglyzers Asbestos Autoclaves Boos Balances and Weights Barrels, Drums & Blowers **Bottling Machinery** Brick, Acid Proof Briquetting and Tablet Making Machinery **Buckets, Elevator** Burners Calciners Calorimeters Cans Carbon Castings Catalysts Cement Centrifugals Chemical Stoneware **Acid Proof** Chemicals. Industrial

Chemicals, Laboratory Chemicals. **Pharmaceutical** Chlorinators Clariflers Classiflers **Coal Tar Oils** Coatings-Protective Collectors Colloid Mills Colorimeters Comparators Compressors Concentrators Condensers Containers **Control Apparatus** Controllers Conveying Machinery and Equipment Coolers Cooperage Crucibles Crushers, Grinding Mills and **Pulverizers** Crystallizing Equipment Cylinders for High **Pressure Gases CO2 Recorders** Decolorization and Purifying Materials **Digesters Distilling Machinery** and Apparatus

Drums, Rotary, Vacuum Drying Machinery and Equipment Dust & Fume Col**lecting Systems Dust and Spray** Masks Ejectors Elevators Emulsifiers Emulsions Evaporators Exhausters **Extraction Plants** Extractors Fillers **Filling Machines** Filter Aids Filter Cloth Filter Paper **Filters Fittings** Furnaces and Accessories Gages Gases Glass-Optical Glassware Grating Grinders **Heat Exchangers Heaters and Heating** Equipment Homogenizers Hoods, Fume Indicators Instruments, Optical

Instruments of Precision Instruments. Testing Insulating Material Heating, Electric and Molded Insulation, Furnace Joints, Flexible Kattles Kilns Labeling Machines Laboratories, Testing Laboratory Apparatus and Supplies Laboratory Furniture Lead Burning and Coating Magnetic Separators Masticators **Material Handling** Equipment Metal Coating and Plating **Metal Containers** Metals Meters Microscopes Mills Minerals Mixing and Kneading Machinery **Molding Machinery** Motors, Electric Naval Stores Nitrators Nozzles, Spray **Nuclear Products** Ovens Packaging Equipment and Supplies pH Equipment **Pipe and Fittings** Platinum-Wire, Sheet, Foil, Crucibles, Laboratory Pressure Relief and **Rupture Relief** Instruments Refrigerating Equipment Regulators, Pressure and Temperature Resins and Oils **Rubber Products** and Equipment Safety Equipment Screens-Inclined. Sealing Machines Sieves, Laboratory Waxes **Welding Equipmen** Sinks, Laboratory, Wire Cloth **Acid Proof** X-Ray Equipment

Packing

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Solvent Recovery Equipment Solvents Spectrographs Spectrometers Speed Reducers Spray Drying Systems Steel Grating and Flooring Sterilizers Stills Strainers Switches Tachometers Tanks Thermometers Thickening and Dewatering Machinery **Tower Packing** or Filling Towers Traps, Steam Tubes Tubing **Turbines** Valves and Fittings Ventilating Apparatus Vibrators Viscosimeters Waterproofing Compounds Water-Condition Equipment

### SEE THEM AT THE 26TH EXPOSITION OF CHEMICAL INDUSTRIES

Now is the time to make your plans

to attend this bigger-than-ever exhibition of chemical progress. See first-time the latest developments in chemicals and raw materials, processing equipment, materials handling and packaging, laboratory apparatus, controls and instruments. Be sure to benefit by this fact-filled concentration of helpful information.

Now, at this bigger-than-ever 26th Exposition of Chemical Industries, you will find the largest amount of useful and valuable information ever assembled under one roof. Bring your associates with you. It will be good for you . . . good for your company.

Plan now to attend . . . December 2-6, 1957.

Management: International Exposition Company

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Fill in and mail this card NOW! No further registration necessary. Your badge will be mailed to you and will admit you to the EX-POSITION as many times as desired. Badge is not transferable.

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#### **Pollution problems?**

What is your company's philosophy concerning pollution abatement? CHEMICAL PROCESSING for November will bring you a ten-point pollution abatement program by William R. Bradley, Cyanamid's Manager of Industrial Hygiene.

Taking a non-sympathetic view of those who lag in solving their own abatement problems, Bradley outlines positive ways in which a company can be a good member of the community and avoid possible litigation and hostility.

#### formula for the future

American Alcolac's President Vova Blinoff and Vice President Carl Pacifico have devised and are using a formula to help them concentrate on the project with the best return on an investment. The formula gives a "Project Number" which is obtained by taking into account information available from research, sales, market research, and production, and subjecting it to the cold light of mathematics for an objective answer.

## Insects and insecticides — who's on top?

"Many destructive insects are learning how to cope more and more with the insecticide ammunition the American farmer is using against them," says C. H. Hoffman, Assistant Director, Entomology Research Div., USDA. His article in November's CP discusses this challenge to the chemical industry. Suggestions are offered, including learning about habits and natural enemies of these insects so that they can be controlled. The chemist and entomologist must work handin-hand if we are to win this

For more information on product at left, specify 1018 . . . see information request blank opposite last page.



# Service ... a stone's throw away!

Wherever you are, expert lifetime engineering service for Swenson processing equipment is a stone's throw from your plant. Swenson operates locally through Whiting easy-to-reach district offices staffed with chemical engineer-specialists. Call on Swenson's nearby engineering service for preliminary planning... surveillance of operation

... and post-installation checks that help keep evaporation, spray drying, crystallization, filtration, and pulp washing equipment humming. Swenson Evaporator Company, 15667 Lathrop Avenue, Harvey, Illinois.

Whatever your position-engineer, president, manager, chemist-be sure to request "An Open Door", our new 12-page booklet that shows how Swenson can assist in solving your processing problems.



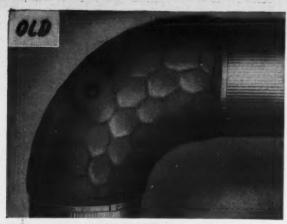
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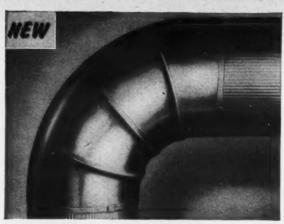




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UGLY, COSTLY CHICKEN WIRE AND MASTIC elbow coverings like this are now obsolete. New Childers Aluminum Ell-Jacs end the need for slow, costly hand-made "patches". Childers Ell-Jacs keep their new look, never need expensive periodic painting or maintenance.



NEW CHILDERS ALUMINUM ELL-JACS now make possible near, weather-tight aluminum protection from one end to the other of your insulated lines. Childers Ell-Jacs are precision formed for long-radius 90° and 45° ells and have factory-applied moisture barrier.

# Childers Announces New Aluminum Elbow Jacketing For Insulated Lines

Revolutionary new Childers Ell-Jacs go on fast and easy . . . fit perfectly . . . cut installation costs . . . never need painting . . . and, used with Childers Jacketing, give your insulated lines that well-dressed look from end to end.

Now, aluminum elbows are made in a wide range of sizes by America's leading manufacturer of aluminum jacketing. Childers Aluminum Ell-Jacs are available for quick, easy application to protect costly elbow insulation.

Childers Ell-Jacs, together with Childers Jacketing, enable you to install maintenance-free aluminum over every square foot of your valuable insulation. You protect all of your insulation investment at lowest cost. You get the bonus of a better looking plant and easier housekeeping. Aluminum keeps its new look, needs no expensive periodic painting.

Positive weather-proofing, too, is assured by exclusive Childers Lap-Seal (Patents Pending). Factory-attached moisture barrier prevents harm to the underneath side of the aluminum.

First cost is less for Childers Jacketing than for any other permanent type weatherproofing—even less than some temporary coverings.

You also get greater strength and greater protection because Childers Jacketing is cross-crimped.

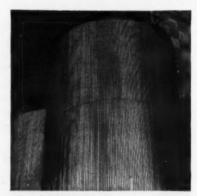
It's easy to install Childers Jacketing. All you need are pliers and screw-driver, plus inexpensive strapping. Two men can do the job. Jacketing can be removed for inspection of the lines, then reapplied without waste.

Why not benefit from Childers world-wide experience when you buy insulation for your lines, towers, vessels, and tanks? More than 2,000 petroleum refining, petro-chemical, and chemical plants will endorse your decision. Childers Engineering Representatives, located in 27 major industrial centers, give professional advice on insulation jacketing.

For a free sample of Childers Aluminum Weather-Proof Jacketing, with engineering data on how to safeguard your insulation, write Childers Manufacturing Company, Dept. CP-15, P. O. Box 7467, Houston 8, Texas.



EXCLUSIVE LAP-SEAL, available at no extra cost, is a series of 8 ribs rolled into the underlapping edge of the iacketing, providing automatic measure of the 2" circumferential lap. Proper lap is assured without waste. Labor is saved. Where desired, a positive weather seal is easily made with Lap-Seal and a mastic.



DEEP CORRUGATED Childers Jacketing in 11/4" and 21/4" corrugations is recommended for permanent protection and improved appearance of insulated towers, vessels, tanks. Deep Corrugated Jacketing with factory-attached moisture barrier is another product available only from Childers.

See Childers' ad in Sweet's Industrial Construction File, Chemical Engineering Catalog and Refinery Catalog.



nuclear notes

# Nuclear fuel shipment goes to Germany

First shipment of uranium to fuel a German reactor was made recently when the AEC released 1800 grams of U-235



Officials sign transfer documents of first uranium shipment to Germany

to the West German Government. The fuel material, uranyl sulfate, enriched to about 20% in the isotope U-235, was manufactured by Mallinckrodt Chemical Works. Value was about \$7500.

#### Heavy water sales

Sale of 37 tons of heavy water at \$28 per lb has been approved by AEC. Sweden will use 26 tons in prototype reactor to be installed outside Stockholm. Australia will receive 11 tons for use in materials testing and research reactor being constructed near Sydney.

### New uranium technique gets go-ahead

The Defense Minerals Exploration Administration has announced an initial grant of \$45,960 to Geo-Resources Corporation of Spokane, for exploration of uranium located on Eastern Washington's Blue Mountain.

This is the first deposit located by use of geochemistry. The new technique provides means of locating uranium Geiger of surface I involves water see subsurface

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### German atomic energy achievements

German nuclear research has come up with two innovations of its own: 1) a simpler and economical method for enriching uranium, and 2) an original power reactor design.

The new processing method involves use of an ultra-centrifuge. It separates U-235 from U-238 to produce 22% enriched uranium. Nine of the centrifuges will go into operation this fall.

The reactor is described as a homogeneous, gas-cooled, graphite-moderated model using ball-shaped cores of sintered uranium carbide and graphite. It is to be built by Krupp of Essen and Brown, Boveri & Cie. of Mannheim.

### Carbon-14 'shots' given to trees

Trees are being injected with radioactive carbon by scientists at Rayonier, Inc., in an attempt to obtain more information on wood growth factors, nutrient uptake, and soil conditions — all vital for promoting conservation of trees as a prime natural resource.

#### Italian firm handles atomic power plants

Fiat, S.p.A., one of Italy's large manufacturers, has agreed to build and sell full-scale atomic power plants under license from Westinghouse Electric International Co.

Turn to next page

# How it Works!

# Only new Sarco TD steam trap uses kinetic energy of steam to close valve

GAS MANTLES have been replaced by electric lights, steam locomotives by diesels, propeller planes by jets.

Now, the use of the kinetic energy of steam principle gives us a modern type of steam trap.

The Sarco TD obsoletes all other types for

most 10 to 600 psi installations. For example, it operates without a valve closing device—no bucket, float, bellows, pins, levers or gaskets.

Glance below and you'll agree that no other steam trap is even similar to the Sarco TD!

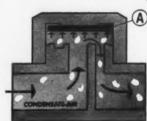
For a trial installation-write today.



Only 3 parts...all stainless steel Sizes 46 to 1"—each body is as small as a tee fitting! Capacity is determined not by a bulky body but by the effective orifice, valve action, pressure drop and condensate temperature.

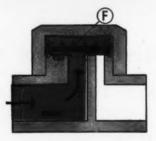
#### Many Advantages

- Practically no maintenance—no valve mechanism, no narrow channels. Trouble-free simple design. Only 3 parts all stainless steel.
- One trap for all pressures—self-adjusting. One large capacity seat for 600 psi as for 10 psi. No changes or adjustments.
- Operates equally well on all loads—on heavy, light or no condensate load. No prime to lose. No adjustments.
- 4. No steam leak required—to operate the Sarco TD. Closes tight against steam.
- Discharges at steam temperature and vents air and air-steam mixtures at startup and during operation.
- Freeze-proof—when installed with outlet down, free to drain.

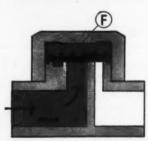


Only Sarco TD Thermodynamic Steam Trap
Uses This Unique Operating Principle
Which Permits Trouble-Free TD Design

Inlet pressure raises disc "A" from seat...
immediate discharge of air and condensate
at steam temperature.



2. Steam follows the condensate and the high velocity jet across the bottom of disc "A" creates a low pressure area (Bernoulli effect)...the jet is deflected into chamber "F" where it builds up pressure by recompression and this pressure acts on the top of the disc "A"...



3. Pressure in chamber "F", acting on full top area of disc "A", exceeds force of incoming steam and low pressure area under the disc...and immediately forces it down, closing the inlet. As condensation decreases the pressure in chamber "F", the disc rises and steps 1 or 2 repeat.

60-day trial convinces... No obligation... Use coupon!

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Regulators – Strainers – Heating Specialties

SARCO COMPANY, INC., Empire S Please send me Sarco TD Steam	Trap and strainer for 60-day trial. Size
Name	Title
Firm	
Address	
City	State
	2164-C

Check 1021 opposite last page.



### Chempump minimizes downtime...

#### pumping bulk nitric acid from delivery truck to customer's storage tank

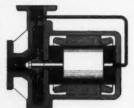
The Chempump mounted on this truck can't possibly leak.

For Pressure Vessel Service, Detroit, this simple fact means a considerable saving in truck downtime and maintenance in the delivery of  $63\,\%$  nitric acid to electroplating plants.

The conventional pump formerly used on this truck persistently leaked acid through its stuffing box. The company faced expensive repair or replacement of the acid-corroded truck bed. Pump maintenance was a continual, bothersome expense. Truck downtime was becoming a serious and costly problem.

Now, with a *Chempump* on the job, leakage is eliminated and maintenance is limited to a simple monthly inspection of pump bearings. No external lubrication is needed—bearings are constantly lubricated by the pumped fluid itself.

In any chemical handling application, *Chempump* offers many major advantages. You'll do well to check them. Write to Chempump Corporation, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives in over 30 principal cities in the United States and Canada.



Chempump combines pump and motor in a single leakproof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.



First in the field...process proved

NUCLEAR NOTES

# Effects of nuclear weapons — handbook published

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Latest knowledge of effects of nuclear weapons is describe in 579-page handbook published by the AEC. "The Effects of Nuclear Weapons" brings up to date a previous book, "The Effects of Atomic Weapons", which was published in 1950. Handbook may be obtained from Superintendent of Documents, US Government Printing Office, Washington 25, D.C., for \$2.00 a copy.

# Work started on new fuel element plant

Ground has been broken by Sylvania-Corning Nuclear Corp. for a new plant to produce fuel elements for atomic reactors. The 25,000 sq ft



New nuclear fuel plant will cover 25,000 sq ft

building will be located on a 3-acre site adjacent to the company's present activity at Hicksville, N. Y. It is scheduled for completion early in 1958.

# No immediate future seen for atomic-preserved foods

Widespread commercial use of atomic energy in the preservation of perishable foods is "a long way off", according to Dr. H. C. Diehl, Director of The Refrigeration Research Foundation, Colorado Springs, Colo.

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The scientific progress being made is highly significant, says Dr. Diehl. But the economic and engineering aspects of these advances still remain to be evaluated and developed in an industrial sense, to say nothing of the public health aspects of eating irradiated foods.

Check 1022 opposite last page.

# Link-Belt Promal chain specified to resist heavy loads and abrasive wear



GREATER WEAR RESISTANCE of Link-Belt H-Class Promal Drag Chain has been proved in grueling conveying service under severely abrasive conditions. Promal's extra strength provides low-cost, long-life performance where ordinary chains fail.

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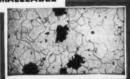
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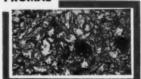
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SSING



MICROPHOTOS show difference between ordinary malleable iron and Promal. Left—white areas in malleable microphoto represent "free iron" . . . black shows soft nodules of carbon. Right—dark areas in Promal structure show stronger, stiffer reinforcing material which strengthens metal; resists distortion, wear.

**PROMAL** 



Specially heat-treated malleable iron provides

extra wear resistance

Fewer conveyor shutdowns and minimized replacements are economies realized by users of Link-Belt Promal chain. Its greater strength absorbs continuous impact loads — and wear resistance supplies the durability to cope with severe abrasion.

Promal is more than a partially annealed or surface-hardened malleable iron. Developed by Link-Belt, this specially heat-treated malleable iron is actually transformed into a metal of radically different physical properties. Promal, because of uniform micro-structure throughout its whole section, provides greater ultimate strength, higher yield point, exceptional fatigue resistance and a remarkable capacity to withstand abrasive conditions.

For unusually abrasive or mild corrosive conditions, Promal chain can be furnished with "file-hard" surfaces. Copper bearing or special alloy content also available.

# Atom standardization steps taken

Steps toward world standardization for peaceful use of nuclear energy were taken by 61 delegates from 13 countries at a recent meeting of the International Organization for Standardization (ISO).

Six areas of work were outlined. They are: 1) Development of tri-lingual glossary of atomic terms, 2) development and approval of warning symbol, 3) adoption of measurement units, 4) development of symbols for drawings, 5) recommendations for measuring radiation, and 6) development of guides for safe design, operation, and maintenance of reactors.

#### Brookhaven gets fourth Van de Graaff accelerator

Brookhaven National Laboratory has ordered a millionelectron-volt (Mev) Van de Graaff particle accelerator from High Voltage Engineering Corp. This brings total number of such machines installed at the Upton, N. Y. laboratory to four. Other accelerators operate with energies from 1 to 44 Mev.

# How and where to apply Promal Chains in the Chemical Industries

Choose Link-Belt Promal chains for highly abrasive conditions—for extra strength and wear resistance demanded by heavy loads or long, sliding conveyors. They last much longer . . . cost but a little more.

The wide range of Link-Belt chains available in Promal includes all types of cast and combination chains.



class C combination chain is one of the most popular types for general purpose elevator and conveyor service. The cast center links and steel sidebar combination forms a strong, rugged yet inexpensive elevating medium. Attachments are available for both cast center links and the steel sidebars so that desired bucket spacing may be accommodated.



# Ley bushed chain withstands grueling service conditions

Rugged, reinforced cast links with renewable, hardened steel bushings on Link-Belt Ley Bushed chains minimize abrasive wear. Shields on integral sidebars deflect dirt and abrasives from joints. Steel connecting pins are also shielded—and locked against rotation. Heels on inside of links provide wear-resistant sliding surfaces and guide the chain onto the sprocket.

HEADQUARTERS for chains, sprockets and other Link-Belt conveying and mechanical power transmission products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor.



LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.;
South Africa, Springs. Representatives Throughout the World.

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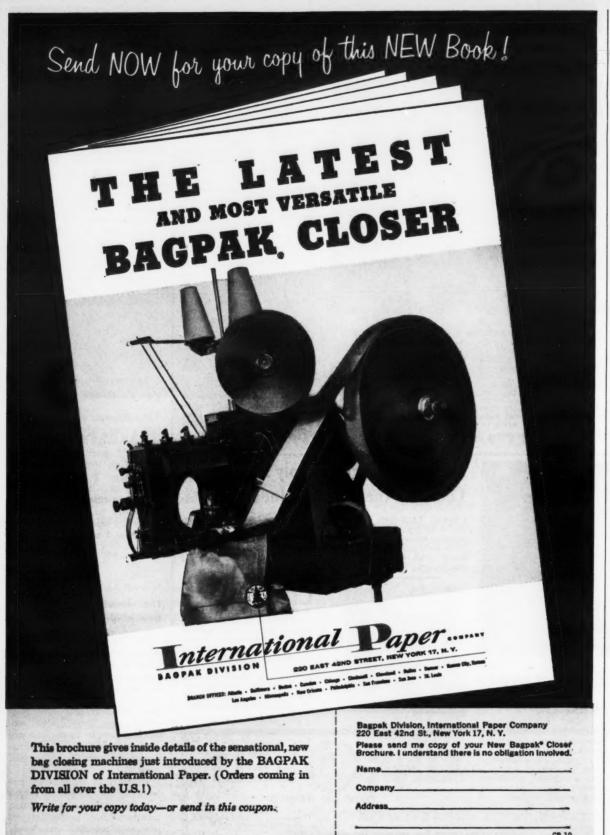
Check 1023 opposite last page.

# Thermonuclear data availability broadened

The AEC has amended its Access Permit regulation to broaden the criteria for access by private individuals or organizations to Secret Restricted Data on controlled thermonuclear processes.

The new amendment extends access to those who are making substantial contribution or furnishing professional services.

These must be directly related to comparative evaluation of fission and fusion processes for production of power or research and development in the thermonuclear field.



**NUCLEAR NOTES** 

## Why not use reactors for process heat?

Some industries may be missing the boat by overlooking possibilities of using nuclear reactors for producing process heat, according to Whaley-Eaton's "Atoms for Peace", a private service located in Washington, D.C.

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Indications that an entirely new field may be opening for use of reactors is contained in special report issued by Whaley-Eaton. "Low-temperature, low-pressure atomic reactors are capable today of producing industrial process heat at costs competitive with conventional methods", report states.

(Further information on Whaley Eaton Service may be obtained by checking 1025 on form opposite last page.)

#### Accent on safety

The Sandia Corp., Albuquerque, N. M., prime contractor to the AEC, has boosted by more than \$1½ million a production contract previously awarded to Applied Physics Corp. Contract is for special instruments to protect health of personnel working near radioactive materials.

### FOR MORE

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

Check 1024 opposite last page.

# Seek propulsion system for atomic ship

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The AEC and the Maritime Administration have extended an invitation to industry for proposals to develop a nuclear power plant, suitable for propelling merchant ships. Power plant will consist of a gascooled reactor coupled with a closed-cycle gas turbine.

### \$3.6 million reactor for Venezuela

Contract has been signed between Venezuela and General Electric Company for the installation of a \$3.6 million modified swimming pool-type reactor. Reactor will be located on the side of a mountain at the Venezuelan Institute of Neurology and Brain Research, about nine miles southwest of Caracas. It is scheduled for completion sometime in 1958.

### Cobalt 60 price down to 2-\$5 per curie

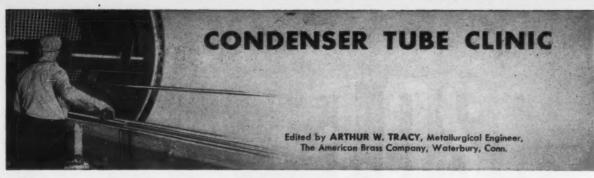
AEC has established reduced prices for radioactive Cobalt 60. Effective Aug. 1, 1957, prices range from 2 to \$5 per curie and are based on the specific activity and quantity purchased. Previous prices were \$50 per curies for the first two curies or fraction thereof and ranged from 2 to \$10 per curie for larger pur-

### Giant atom smasher for Florida State

Florida State University has announced that it will install a 10-million-volt Van de Graaff tandem accelerator at its proposed nuclear radiation center. Machine will enable physicists to study the proton energy range from 5 to 10 million electron volts, an area which has been studied only to a limited degree until the development of the tandem-type atom smasher.



Check 1026 opposite last page.



### Some Operating Factors that affect tube life

#### OXYGEN AND AIR

Oxygen in the air in cooling waters is a necessary factor for corrosion to occur, but normally the presence of oxygen in solution does not cause rapid corrosion of condenser tubes. On the other hand, air in the form of bubbles can cause rapid corrosion of condenser tubes under conditions where turbulent flow is present. Air bubbles of harmful size may be produced by whirlpools in the intake tunnel, leaky packing glands on pumps, and at projections in injection pipes or water boxes. Any condition that will produce a negative pressure at some point along a tube, such as a long outlet water leg from a condenser, can also cause air bubbles to form with consequent local rapid pitting.

Sea-chest strainers may be another source of air bubbles unless designed to allow nonturbulent flow of water.

#### STRESSES

Stresses capable of causing stress-corrosion cracking of some alloys can be set up in tubes by thermal expansion pressure or from the rolling-in of tubes into tube sheet. It is not usually possible to change operating conditions to reduce stresses, but failures from stress-corrosion cracking can be minimized by the careful rolling-in of tubes to avoid developing high longitudinal stresses, especially when both ends of the tubes are expanded into the tube sheets.

Cyclic stresses due to vibration can cause fatigue failure of condenser tubes, and such a failure can be extremely rapid even when only tiny corrosion pits have developed on the wall of the tube. If the source of the vibration cannot be removed, the vibration of the tubes can sometimes be dampened.

#### **GALVANIC EFFECTS**

The galvanic corrosion of condenser tubes is seldom a problem because the choice of metals is usually such that the tubes are galvanically positive (cathodic) to the tube sheets and the



**EQUIPMENT FOR TESTING** condenser tube alloys for resistance to corrosion. Specimens are rotated under water to determine the effect of velocity. Further information is obtained by testing actual condenser tubes in operating condensers.

water boxes. Any slight galvanic corrosion on tube sheets and water boxes due to their being anodic to the tubes is insignificant because of their relatively great thickness.

Zinc or magnesium sacrificial anodes are frequently placed in condenser water boxes that have been treated with paint or an organic coating to protect the iron or steel from accelerated corrosion at "holidays" or pinholes in the coating. Such anodes will generally protect the ends of the tubes from corrosion for a short distance, usually equivalent to about two tube diameters.

There is considerable experience indicating that bare iron or steel water boxes not only act as sacrificial anodes in protecting the ends of condenser tubes, but also that the corrosion products from these water boxes mixing with the tube corrosion products help build a more protective film along the whole length of the tube. Iron anodes in painted water boxes will be a source of iron compounds but will have little effect in galvanically protecting water boxes at the discontinuities in the paint

film. When a new set of tubes is started in service in an old condenser where surfaces are well scaled, the use of new, clean iron anodes should aid in a more rapid formation of protective film on the tubes.

#### TECHNICAL HELP IN SELECTING TUBES

Your situation may require special consideration and analysis. We are always ready to help and advise in the selection of the right alloy to give best service. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

# ANACONDA® TUBES AND PLATES

for Condensers and Heat Exchangers

Made by THE AMERICAN BRASS COMPANY

over the reader's shoulder

#### **Unions and Patents**

Gentlemen:

Reference is made to the August 1957 issue of Chemical Processing, and more specifically the two articles "Engineers Must Be Unionized," J. Amann, and "An Amplification Of Problems Surrounding Patents." These articles appear on pages 38 and 40 respectively.

Both of these articles are quite timely and in addition are meritoriously presented...

My interest is in possibly securing permission for the reprinting of the articles on the unionization of engineers.

H. A. LEVEY, MANAGER AMERICAN PRODUCTS MFG. Co.

#### **Corrosion Feature**

Dear Sir:

Thank you very much for forwarding a copy of the July issue of your magazine containing the articles concerning Westvaco's corrosion prevention activities. We believe you have made a nice presentation of the subject.

May I take this opportunity to congratulate you on a very thought-provoking and at the same time informative issue in respect to corrosion and its mitigation and to the education of men who carry on such work.

WM. VAN V. BACON
CHIEF MATERIAL
& INSPECTION ENGINEER
WESTVACO CHLOR-ALKALI DIV.
FOOD MACHINERY
& CHEMICAL CORP.
South Charleston, W. Va.

#### Unions for engineers

Dear Sir:

Our compliments to Joseph Amann and to CHEMICAL PROCESSING on the article "Engineers Must Be Unionized" in the August issue.

Mr. Amann is eloquently

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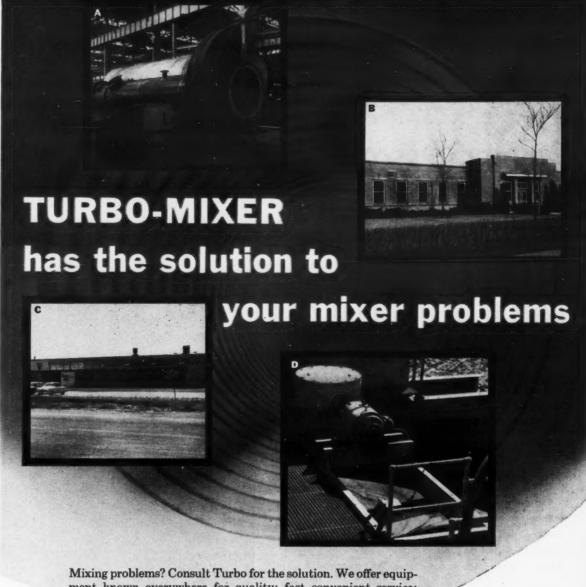
CHEMICAL PROCESSING is to be complimented for presenting to its management readers some forthright facts that they had better hear.

Now, of course, will come a harrage of "ifs" and "buts" telling why engineers cannot or should not be organized. So be it. Inevitably, they will be unionized; only the timetable is uncertain. When engineers unionize they will not necessarily follow the patterns followed by unions or hourlypaid workers, for their problems are different, but they will sooner or later engage in plain collective bargaining for contracts fulfilling their needs. As Mr. Amann so correctly says, "Forming an organization to get something done is the story of our country's history."

O. A. KNIGHT, PRESIDENT
OIL, CHEMICAL
AND ATOMIC WORKERS
INTERNATIONAL UNION
Denver, Colorado

The editors of CHEMI-CAL PROCESSING Magazine are always interested in the opinions of our readers, and will publish as many letters as possible in these columns. Address your letters to:

John C. Vaaler, Editor
CHEMICAL PROCESSING
Magazine
111 East Delaware Place
Chicago 11, Illinois



Mixing problems? Consult Turbo for the solution. We offer equipment known everywhere for quality; fast convenient service; complete laboratory facilities staffed by engineers who will be glad to work with you. For a high-production, low-maintenance mixer program, call on TURBO.

A No worry about quality with modern Turbo-Mixer facilities like these at Sharon, Pa. All the capacity you require, in Turbo-Mixer Class "A" shops capable of handling mixers from 2" to 20' diameter—¼ to 500 H.P.

B For your special problems or the development of new designs, all the technical knowledge and experience of Turbo-Mixer research men is yours to use. Here we have complete facilities for laboratory and pilottesting to solve your mixer problems.

C Turbo-Mixer service is fast and efficient...like this new office at Compton, California, Turbo-Mixer has 26 sales and service offices throughout the United States and Canada—plus Erection Service Departments strategically located to serve you.

D Evidence? The bevel gear Turbo-Mixer drivehead in this picture is still in A-1 operating condition after more than 100,000 hours of continuous service with only normal maintenance. It's just one of hundreds of equally satisfactory Turbo-Mixer products serving today's tough industrial requirements.



# TURBO-MIXER DIVISION GENERAL AMERICAN TRANSPORTATION CORPORATION

SALES OFFICE: 380 MADISON AVENUE, NEW YORK 17, NEW YORK. General Offices: 135 S. La Salle St., Chicago 90, Illinois. Offices in all principal cities. DON'T MISS TURBO-MIXER AT THE CHEMICAL SHOW...BOOTH 446

Check 1028 opposite last page.

# YOU CAN RECOVER **OVER 80%**

# **PENTANES PLUS** FROM LEAN NATURAL GAS

100 pounds of Davison Silica Gel adsorbs 1.5 to 3.0 gallons of hydrocarbons at 80% recovery efficiency

Why lose valuable hydrocarbons suitable for sale as gasoline, when you can recover them so easily with Davison Silica Gel?

This desiccant has high capacity for moisture and hydrocarbons, so minimum size equipment does the job. You'll find, too, that Davison Silica Gel is readily reactivated . . . gives low dewpoints . . . resists fouling . . . gives low pressure drop . . . is hard, tough, non-dusting and non-corrosive.

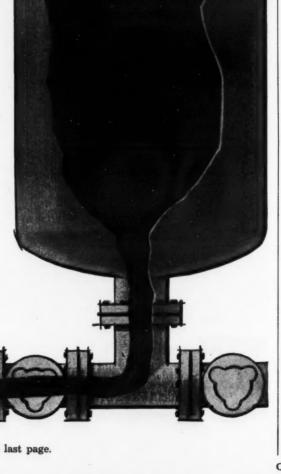
Why not get the whole story? See for yourself why Davison Silica Gel is ideal for natural gas dehydration and hydrocarbon recovery. Write today for literature.



#### DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co. **Baltimore 3, Maryland** 







RICHARD C. McCURDY, became president of Shell Chemical Corp. in 1953 after a career in petroleum industry spanning 20 years. He obtained his AB and **Engineering Mines degrees from** Stanford University, Starting as a roustabout for Shell Oil Company in 1933, he advanced through increasingly responsible positions in California, Washington, and with an associated company in Venezuela before taking over the reins of Shell's pioneering petrochemical subsidiary. Mr. McCurdy is currently a director of Shell Oil Co., and a former vice president and director of the Manufacturing Chemists' Association.

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With natural gas playing an increasingly important role as a chemical raw material, future gas supply and price could hold one of the keys to petrochemical prosperity. Present laws are discouraging exploration for new reserves. Proposed legislation could be the answer to continued adequate supply.

# **Natural Gas Controversy**

A lot at stake for the chemical industry

R. C. McCURDY, President Shell Chemical Corporation

ON June 7, 1954, a decision of the U. S. Supreme Court touched off the natural gas controversy. Endangered in the flare-up is the future supply of natural gas and, in turn, our current price levels. Industrial consumers face one possible outcome: less gas for future growth at higher prices.

This possibility brings the controversy close to home. In the chemical industry, natural gas provides fuel and certain chemical building blocks out of which we shape some of our chemicals. Many of our bread-and-butter products and some of our fast-growing ones, such as new plastics and synthetic rubber, come from components of natural gas. (See box) Thus, our future growth in many fields is tied to the supply of this raw material.

What does the future supply picture look like? How is it affected by the controversy? What effect will the controversy have on price?

To go back a bit. The controversy started over the volatile subject of federal regulation of the price at which producers sell their gas to inter-state pipelines. The Supreme Court held that this price should be regulated under the Natural Gas Act of 1938. The effect of this was that

prices had to be determined on the same basis as the prices a utility company charges a consumer for gas . . . cost-plus.

Long used to having their prices set in the open market by customer demand, the producers said that the man-made formula for price regulation would smother incentive to drill for new wells.

A man who drills exploratory wells is basically a risk-taker, prepared to lose real money when he drills dry holes. If he finally drills a successful well, he naturally has to have a chance to recover his whole losses, not merely the money spent on the successful attempt, and to earn enough besides to make him willing to continue risking money in further ventures.

As a sidelight on this situation that would be amusing if it were not so tragic, this sort of regulation would work to give greater reward to the inefficient producer. A man who spends a million dollars to find a new well that will produce a small amount of gas would be allowed to make \$90,000 a year (at the present rate of 9%), while another more efficient man who spent only \$100,000 and brought in a large field could realize only \$9000.

Producers warned that if the

present regulations were allowed to stand, they would be forced to one of two alternatives — either cut back exploration for new wells, or sell new gas production only intra-state where federal price regulations do not apply. The latter choice would restrict natural gas from new wells to the few producing states

Legislation was drafted to re-

move federal controls. With the backing of the administration, the bill passed the House and the Senate by slight majorities in 1955. But a controversy about campaign contributions caused the President to veto the bill in spite of its merits.

New legislation is now before Congress. From the producers' standpoint it's a distinct com-

Turn to next page

#### CHEMICALS FROM NATURAL GAS

Chemical	Quantity derived from natural gas	Ind. use
Anhydrous Ammonia	80% of 1956 production of 3.3 million tens	agriculture
Synthetic Methanol	over 90% of 1955 produc- tion of 1.3 billion lb	formaldehyde, chemi- cal synthesis, anti- freeze
Formaldehyde	100% — 1.3 billion lb in	resins and plastics, adhesives
Ethylene	60% of 1985 production of 3 billion lb	polyethylene, ethylene glycol, ethyl el- cohol, ethylene oxide
Acetylene	10% in 1955 and climbing, due to beem in chemical synthesis	vinyl resins, neoprene rubber, insecticides, plastics, acrylinitrile
Carbon Black	47% of 1986 production of 1.8 billion lb	
Synthetic Rubber	no figures available	du rollenn on tude
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Production of ammonia and urea on an around-the-clock basis, at Shell Chemical's Ventura, California plant. Products are two of many petrochemicals which are derived from natural gas

Starts on page 25

promise. Known as the Harris-O'Hara bill, the legislation continues federal regulation of producers' prices to inter-state pipelines.

Producers favor the bill, primarily because it frees them from all existing regulations except as to their prices. And the bill gives them a more realistic standard for determining "reasonable market price". Prices, under the new bill, would be determined by competition, quality of gas, condition of delivery, how the contract between the producer and pipeline was arrived at, and the effect of the contract on gas supplies for the consumer.

Producers feel that the factor of competition gives the new formula its soundest note of realism. For competition in the industry is strong: It takes the leading 50 producers to account for over half of total production (66 percent). In other extractive industries, the 50 percent mark is topped by the first four companies: copper, 80%; iron ore, 62%; lead, 56%. Similar comparisons to manufacturing industries run as follows: woolen and worsted fabrics, the first 20 companies, 56%; steel, first eight, 62.8%; meat packing, the first 20, 62.5%.

Most of the large distributing (utility) companies have given their support to the legislation. Their backing was won for two reasons: 1) the bill outlaws certain types of price-escalation provisions between producers and pipeline companies which distributors dislike; and 2) they feel it will give producers incentive to develop existing wells and find new ones, thus, insuring distributors of sufficient supplies to meet expanding demands.

Meanwhile, what has been happening in the natural gas industry since the fields were put under price regulation? Regulation has been in effect since July of 1954, and the supply of natural gas has not dropped off, nor have reserves. These facts seem to contradict the warnings of producers. How come?

For a moment become a producer. Like you, he's first of all a businessman. He invests money and time, and expects to get a return on his investment. But here the parallel ends. Most of his money is invested in what we can call research. His scientists search not for a new product, or a new way of making an old product, but for the place where a product can be found. And like all research, his is based on an intangible . . . the belief that he will find natural gas somewhere beneath the spot his scientific crews have marked on a map.

As in industry, some of his research projects fail. He drills a dry hole. In industry the cost of our failures is carried by our successes. The same used to be true for the producer. The Supreme Court decision changed that. Under existing legislation, he can get a return only on the money invested in a successful well

When the court's decision was handed down, producers were faced first with the problem of what to do about ventures now under way. Since producers work five years in advance of "delivery" date, they had crews drilling promising sites, exploration parties searching for new fields, followed by land men, who sign leases (usually of five to ten years duration) on prospective areas. Here was money already invested that could not be recovered - nor a profit shown unless drills finally chewed down to producing wells. They made the only decision possible . work the most promising land. And it is from that land that all new gas wells are producing.

face a second one. What to do about future investments? Should they continue to search for new fields where the odds are nine to one against discovery, or should they restrict their drilling to producing fields, where the odds are a more comfortable three out of four? Or get out of the business entirely?

Although the search for gas is generally a part of the search for oil, the profit can be so completely removed from this end of the business that substantial new sources of supply will not be forthcoming.

The demand for natural gas will grow at an estimated seven percent a year through 1965. We will need discoveries of new fields to meet that demand. Otherwise, there will be a scramble among consumers for the limited supplies. Prices will rise. And the needs of the chemical industry will be given less heed than the demands of the thousands of home owners who already use gas or want to convert to it, so we will be the ones looking for substitute supplies.

To my mind, it seems logical for the chemical industry to support the legislation now before Congress. Its price regulation features alleviate any fear of uncontrolled prices, if there was any ground for such fear in the first place. More important, since producers feel that it provides them with sufficient incentive to look for new wells, it will help insure future supplies.

That decision made, producers

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#### Unionism for engineers — good or bad?

In August, CHEMICAL PROCESSING magazine published the article, "Engineers Must Be Unionized". Written by Joseph Amenn, President, Engineers and Scientists of America, it presented the union side of the coin — pointing out why engineers should join unions and what they could expect to accomplish if they did join them.

At that time we also told you that the other side of the argument would be cited in the near future. Here it is. The editors do not advocate unionism, or non-unionism, for engineers; but we do believe that the best thinking on the subject should be brought to your attention. What are your viewpoints . . . we'd like to hear from you.

The Editors

The market place for professional talent is wide open today. Demand is high for persons who can make decisions and accept individual responsibility. In order to fit into this category and be classified as truly professional...



". . . the time and effort involved in the work of a professional is usually not regulated by a clock . . ."

# engineers should not join unions

JOHN 5. WILSON,

Management Counselor

Heidrick and Struggles Incorporated

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The key objection to unionism for engineers is the conflict between the individual responsibility of a professional employee and the collective activity of a labor organization. The number of unions existing today that permit individual bargaining between members and their employers are so few that they are exceptions to the general rule, and are of note solely because they exist at all.

If college graduates are unwilling to accept individual responsibility for their careers, it seems that we are missing the boat in our educational system. Furthermore, those men willing to let someone else take responsibility from them in matters governed by bargaining are depriving themselves of the oppor-

JOHN 5. WILSON is currently an associate in the firm of Heidrick and Struggles, Inc., Management Counsel, 20 North Wacker Drive, Chicago, Ill. Prior to this, he spent over 17 years with Corn Products Refining Company, having had various assignments in research, engineering, and personnel management. He was Director of Executive Development for 31/2 years.

Mr. Wilson has a Bachelor's degree and a Masters degree in Physical Chemistry from Indiana University. He is a member of the American Chemical Society, American Institute of Chemical Engineers, American Society for Engineering Education, and the Chemists' Club (New York).

tunity for developing their own leadership qualities and self-reliance.

Engineers should recognize that unions cannot run themselves. Someone must do the work, and that person, quite nat-

urally, will have his own selfinterest at heart. Who should run the union — if there is to be an engineer's union? Will it be the best engineer, or the best parliamentarian? Are engineers willing to require every engineer to conform to the majority of those union members who feel their best interests are served by collective bargaining?

It is interesting to note the number of unions authorized to bargain collectively that have in their constitution a statement calling for some sort of financial support from their members. Whether these collections are labeled dues, service fees, or something else, the accumulation of these funds over a period of time creates a tempting source of power that can be used to determine whether or not an employee will be permitted to perform the work of his choice in the company of his choice.

The result of this activity is a situation wherein every individual in a given bargaining unit becomes forced to conform to the will of the majority. The pressure of conformity in an association of

Turn to page 126



Creole Petroleum Corporation's overwater derricks stretch over Lake Maracaibo in Venezuela. Venezuela produces more oil than any other nation in the world except the United States

Contrary to the oft-stated opinion that we'll have no gasoline for our automobiles or oil and gas for our industries and homes a few years from now, Lewis G. Weeks — one of the foremost authorities in the world on this subject — says...

"We are adding almost  $1 \frac{1}{2}$  bbl of new oil to our reserves for every bbl we take from the ground." "As long as the mind of man is active, and free to explore the abundant resources of nature, we do not need to fear any shortage of petroleum and other fossil energy supplies."

# We are not running

Chief Geologist
Standard Oil Company (N. J.)

Ever since man first discovered that he could obtain certain useful materials from under the surface of the earth, he has become increasingly dependent upon them, until today the energy derived from such substances as coal, oil, and natural gas has become essential to the continuance of our modern civilization. Therefore it is not surprising that fear of our dependence on them has led many people to wonder at the extent of our fuel reserves.

Geologists' estimates of proved reserves of fuel — our current stocks on hand — have always been very conservative, as we can see by comparing past estimates with actual recoveries. One reason for this is that proved reserves are constantly being replenished from a source of supply that is still undiscovered — a source of supply which only continued energetic exploration will make available to us.

The situation is analogous to that of the merchant at the corner store who keeps a stock of goods on his shelves in anticipation of the immediate needs of his customers. His shelves are always full because he makes up for what he sells by obtaining more goods. If his store is attracting more customers, he expands and carries a larger inventory.

In the same way, reflecting rising demand, withdrawals of oil in the United States have increased from 0.4 billion barrels in 1920 to 0.9 billion in 1930, 1.4 billion in 1940, and 2.9 billion barrels in 1956, yet proved crude oil and condensate reserves have steadily risen over the same period from 7.2 billion barrels in 1920 to 36.3 billion in 1956. In fact, as much oil as was known

to exist in this country in 1942 has been produced since that year — yet today domestic proved reserves are at the highest level in the industry's history. In the rest of the free world, these proved reserves have had an even more rapid increase until they stand today at upwards of 260 billion barrels.

Technical Advances Provide More Oil

The rate of discovery of new oil is not the only unpredictable factor affecting proved reserve estimates. The magnitude of

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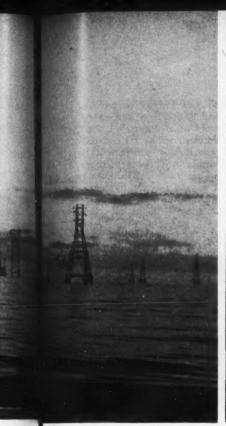
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CHEMICAL PROCESSING

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more oil





Oil well derrick over Saudi Arabia's shifting sands. An estimated 80% of the world's proved reserves are in the Middle East

# out of fuel

Lewis G. Weeks has furnished much of the information that has been published on fossil fuel reserves by the Government and others for a number of years. His own publications on this subject have been numerous. He is considered by many to be the outstanding authority in the world on petroleum fuel reserves. Mr. Weeks has been chief geologist of Standard Oil Co. (N. J.) for the past three years. Before that he held a number of other positions at Standard and earlier in his career was with other organizations in geological work. He is active in a number of technical organizations. Mr. Weeks received his AB degree in geology at the University of Wisconsin and did graduate work at Cornell University



proved reserves is calculated in terms of current techniques and costs, so it follows that anything which works to lower the costs of finding and developing oil adds to available reserves. For example, if our practices of geology and geophysics in the United States had been 10% more efficient in 1955, it has been calculated that we could have found and developed the same amount of oil with 10% fewer dry holes, at a saving of \$170 million. Or, to put it another way: with such a 10% reduction in the cost of finding oil, the industry could have produced 10% more oil with the same outlay of capital. We could work similar savings by developing even slightly more efficient drilling methods, for today drilling costs alone account for 47% of the expenses of the producing industry.

We can also increase our usable petroleum reserves by new methods of conservation and secondary recovery. Mr. Paul D. Torrey, in an address before a meeting of the Interstate Oil Compact Commission in 1956, estimated that of the 290 billion barrels of oil originally in the known reservoirs of the United States we will be able to recover only about 1/3 with presently known techniques, and at the

prices for oil that have been current over recent years.

However, the IOCC recently estimated that, with the benefit of gas and fluid injection, unitization, and other methods, presently known US oil fields, on the average, can be expected to produce up to 40% more oil than would have been recoverable without these procedures. For example, fluid injection already accounts for over 1/3 of the current daily production of the State of Illinois.

Obviously, these and other technical advances are not to be achieved overnight. Still, time is on our side, for the accumulative past experience of geologists and engineers furnishes vital data on which to base each forward step. In a sense, every barrel of oil we draw from the ground is helping us find new oil — not only by teaching us more about the field from which it came, but by maintaining a healthy, dynamic industry which can afford to finance today's necessarily exhaustive research programs.

While research, in developing new ways to find and produce oil, adds to our proved reserves, it is a field of activity whose advances are impossible to predict. This is because they depend on

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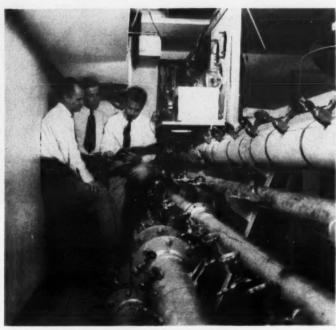
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such important, intangible human resources as initiative and ingenuity. Thus, while new exploration, drilling and producing methods will undoubtedly be developed in the future, it is impossible to forecast the extent to which our known reserves will be increased thereby.

dution per cubic mile (cubem) or per cubic kilometer (cubek). However, the fallibility of this method is that productivities of various basins may range from less than a thousand barrels of oil per cubem of basin sediments to several million. It is difficult to predict average production per



Three Carter Oil Company engineers conduct an experiment using an "oil reservoir in a pipe," a device for testing modern secondary recovery methods in the laboratory. Secondary recovery can be expected to boost the yield of presently known US oil fields by an estimated 40%

The geologists' estimate of proved reserves are usually conservative in themselves. In addition, adequate consideration is usually not given to technical advances that increase the supply of oil. Hence, the estimate of ultimate potential resources is very conservative.

#### Estimates: How Reliable

All predictions are based on the interpretation of certain data. Since so many authoritative estimates differ widely, it might be interesting to examine the reliability of some of the data upon which they are based.

One way of estimating ultimate potential oil resources is to project, in space and time, artificially chosen figures of average oil pro-

acre without extensive exploration. Yields per acre may also range from as low as a few hundred barrels of oil to as much as a million, as in certain California fields. Likewise, anywhere from 0.1% to as much as 5 or even 10% of a basin's area may be commercially productive. While I concede that this system is useful in comparing or rating basins, I think it is very misleading to apply it to the direct estimation of the production potential of individual areas.

Other authorities have used the results of exploration to date in the United States as an average for other areas — even for the world. However, vast areas are destined to produce little oil, whereas there are other areas (Kuwait, for example) which, although relatively minor by comparison, will produce large volumes of oil. It is not uncommon—indeed, it is quite logical—to find large areas representing the two extremes side by side in the same basin.

I do not believe, either, that the projection of demand and discovery curves alone is a sound basis for estimating the amount of oil, or any other mineral, in an area, basin, country, or the world — not even in the United States at its present high state of development.

How, then, should we go about forecasting the extent of our ultimate potential oil resources? The only determinants that have any general application, and which can be classified as basic today are (1) geology, and (2) experience on the broadest possible scale in what the geology means in terms of oil occurrence. My estimates were made, basin by basin, after careful study of each basin's geology, and are based on world-wide experience and analysis of the relation between oil occurrence and basin type, architecture, and many other pertinent geologic and engineering facts. Of course, such data cannot always be relied upon to be accurate and may be subject to wide interpretation. And figures of ultimate potential resources should never be looked upon with anything like the same confidence as proved reserves. With these qualifications, I believe that both the estimates of proved reserves and those of ultimate resources set forth herein are very conservative.

#### World Petroleum Resources

My estimates indicate that total world ultimate potential liquid petroleum resources, recoverable by conventional primary methods in terms of current economics, will be on the order of 1500 billion barrels. Of this total, 93 billion barrels have been produced as of January 1, 1957, some 300 billion barrels constitute proved reserves, and about 200 billion barrels are thought to underlie the continental shelves and inland seas. The United States' estimated share of the total 1500 billion is 240 billion barrels, including cumulative production and proved reserves of 55.1 and 36.3 billion barrels respectively as of January 1, 1957.

In addition to the oil and natural gas liquids which will be recoverable by primary methods, that which man may ultimately find a way to recover by secondary means may be just as large.

From where will this oil come? At least 80% of the world's proved reserves are in the Eastern Hemisphere, and over 80% of these are in Kuwait, Saudi Arabia, Iran and Iraq — the four principal oil producing countries of the Middle East.

At least 2/3 of the world's ultimate potential primary reserves of oil and natural gas liquids are also in the Eastern Hemisphere. Of these, perhaps nearly ¼ are in the vast territory of Soviet Russia and her satellites. To date these countries have accounted for less than 10% of total world discoveries, and but slightly over 10% of the world's cumulative oil production — yet they possess 31% of the land mass and about 38% of the sedimentary basin area of the Eastern Hemisphere.

To put these facts in their proper perspective, we should remember that less than 1% of the sedimentary basins of the world have been extensively explored for oil, and, even in the most closely investigated areas, much more remains to be discovered.

#### Other Sources of Oil

So far I have spoken only of that oil we will be able to obtain from sediments in the familiar way. We will also be able, when and if it ever becomes necessary, to derive liquid hydrocarbons from oil shales, tar sands, coal, and other sources not used at present.

Various authorities have estimated the size of the vast resources of oil contained in the oil shales and tar sands of North America. The general agreement on their order of magnitude was well summarized by Wallace Pratt in a recent report to the Joint Congressional Committee of the Impact of the Peaceful Uses of Atomic Energy. He stated that the estimates reveal, within the United States, the existence of 535 billion barrels of oil in

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In August, CHEMICAL PROCESSING carried two articles on the tariff question — Dr. Lewis E. Lloyd, Dow Economist, presenting the case for protective tariffs — and Sidney A. Swensrud, Chairman of the Committee for a National Trade Policy and Ex-Chairman of Gulf Oil, presenting the case for a liberal trade policy.

In September seven chemical company executives commented on the two tariff articles car-

ried in August. Some of these men favored high tariffs and some low.

Here the debate is continued as Bill HR 6630, presently before Congress, is discussed. HR 6630 would authorize the President to accept membership by the US in an organization to be called "Organization for Trade Cooperation" (OTC), which would act as the administrative arm for the General Agreement on Tariffs and Trade (GATT).

# THE TARIFF QUESTION and the COAL-TAR CHEMICAL INDUSTRY

R. W. HOOKER

From the standpoint of the chemical industry — particularly that portion of it concerned with the manufacture of coaltar chemicals and dyes, the rules of GATT will ruin a business which has come to be probably our most important unit of national defense. Congress should not pass HR 6630, approving US membership in OTC and should limit the extent to which GATT may be continued with our support.

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In any consideration of the question of support or opposition to HR 6630 (OTC) the basic inquiry would seem to be; what has the administration of GATT accomplished which would not have been accomplished by the application of the old law of supply and demand?

A review of certain statistics will disclose some facts in connection with our foreign trade which appear to produce some very interesting conclusions.

The year 1920 was nearly free from disturbing causes. In 1920 our largest volume of foreign trade since 1900 took place. It is, therefore, fair to compare that year with 1956 shown by our most recent official statistics.

Reducing our tariff rates and destroying the equality of oppor-

#### TABLE I

1920 discloses the following

approximate figures:

Exports \$ 8,200,000,000

Imports 5,100,000,000

1956 shows:

Exports \$19,000,000,000

Imports 12,400,000,000
Thus our imports increased .......143%
and exports increased .......137%

#### TABLE II

 1920 Exports
 \$ 8,200,000,000

 1920 Imports
 5,100,000,000

 Total
 \$13,300,000,000

Thus the volume of exports to total foreign trade was 61%

#### TABLE III

1956 Exports \$19,000,000,000 1956 Imports 12,400,000,000

Thus the percentage of exports to total foreign trade was 61%

tunity in the United States' markets for many manufacturers has resulted in coming out of the same foreign trade hole into which we went.

In 1956 the United States paid indirectly for a considerable portion of the total exports. We did not do that in 1920.

NOTE: All the foregoing are merchandise or service transactions, strictly "trade" and not "aid."

It would appear strange that the highly vaunted GATT has thus fallen so far behind the parade as to cause us to wonder whether or not the old-fashioned economic law of "supply and

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R. WOLCOTT HOOKER is President of the Synthetic Organic Manufacturers Association. He has held similar executive positions with other chemical organizations and has served actively on a number of government boards and committees concerned with the chemical industry.

In his present position at Hooker Electrochemical Company, Mr. Hooker is Senior Vice President. He has held a number of other positions at the company since he first joined it in May 1922 after his graduation from Cornell. He has been active in Boy Scout work and other community affairs for many years.

#### TABLE IV

Total Imports, Exports and Percentage of Exports to Total Foreign Trade in Five Year Periods

> Years 1901 through 1956 (000 omitted)

Years	Imports	Exports	Total Foreign Trade	Percent of Exports to Total
1901/1905	\$ 5,060,285	\$ 7,389,125	\$ 12,449,410	59.35%
1906/1910	6,898,471	9,068,962	15,967,433	56.79%
1911/1915	8,710,901	12,644,058	21,354,959	59.20%
1916/1920	17,381,504	34,013,684	51,395,188	66.18%
1921/1925	17,113,740	21,985,133	39,098,873	56.22%
1926/1930	20,101,752	23,886,568	43,988,320	54.30%
1931/1935	8,521,448	10,125,973	18,647,421	54.30%
1936/1940	12,200,209	16,094,484	28,294,693	56.88%
1941/1945	17,333,869	48,426,067	65,759,936	*73.64%
1946/1950	33,007,874	59,097,591	92,105,465	*64.16%
1951/1955	54,155,543	76,651,173	130,806,716	58.60%
1956	12,400,000	19,000,000	31,400,000	60.51%
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\*Includes some things bought with our own American dollars.



When Research develops a new product or when a company wants to expand into another product line, a host of factors must be considered before management can issue a go-ahead on further development, construction of facilities, and, finally, production and sale of the material. To facilitate a more orderly evaluation, W. R. Grace's Polymer Chemicals Division has worked out a series of "must" factors to consider. Here

are Grace's . . .

# steps toward profitable new products

T. T. MILLER, President Polymer Chemicals Division W. R. Grace & Company

Crystal ball gazing is going out of fashion as a means of trying to project the profitability of new products. Certainly it would be simpler than some of the methods now employed. And perhaps because of its contemplative and studious attitude it might be better than no method at all, but we have more advanced methods now for predicting the outcome of a new venture.

What are the improved ways in which a company utilizes its experience, research, and manpower before embarking on a new field or a new product line? How do the men at the top arrive at a decision that may change their whole course of action and "make" or "break" their company?

Methods for arriving at profitable decisions have been discussed for years. Managements are constantly being prodded with helpful hints and timely articles and seminars in the lively art of "trying to make a buck" using the help of a sound decision based on adequate plan-

Here, I'm not going to rehash all the splendid words that have been written on the subject. I'm going to talk about the steps my division of the W. R. Grace Company uses in projecting the profitability of new ventures. This is a distillation of the experience of several of the divisions in the Chemical Group of W. R. Grace, as well as some other firms to which we have been exposed along the way.

In looking at new ventures, management must answer several questions: How do I winnow out the promising ideas from the duds? Which new products are headed for a profitable upswing instead of a painful obsolescence? There are not enough hours in the day nor days in the month nor men on the staff to pursue the analysis of every potential new idea down to the last decimal point of estimated return on investment. So a screening process is needed for sorting ideas, beginning with a coarse screening, then successive screenings that increase in fineness until the projects that are left are few enough in number and promising enough in caliber to concentrate upon in the final fine analysis.

The early screenings can be largely qualitative, almost a series of check-off points. In this case we have something in common with a popular movie of the 1930's, since revived for television's late late shows, known as "The 39 Steps." I'd like to call the factors "The 39 Steps toward profitable new products."

In the Polymer Chemicals Division we examine a number of factors step by step, and for each factor we will assign the new product idea a rating of very good, good, average, poor, or very poor. The factors are then arranged into groups, and for each group we will have a chart on which the ratings of the individual factors can be spotted and subsequently connected by means of a profile line. After we have completed the chart for each group of factors, the entire profile of the new product can be spread out and examined. Too many poor or very poor ratings will show up visibly and vividly, and the new product idea can be discarded. If the profile hovers back and forth mainly near the average line, the new product idea ought to be put on the shelf. It may, however, be re-examined after we have run out of brightly promising ideas whose profiles show a goodly proportion of good and very good ratings and with few, if any, very poor ratings.

We do not feel that it is feasible to design a constant numerical weighting for each factor. But we do apply the judgement factor, and discount any very poor or very good ratings which seem to have relatively minor importance in the particular project under study. After this, we appraise the profile as a whole.

Let's now run through the groups of factors that comprise our qualitative screening.

Stability factors

The first group of factors considered in our qualitative screening consists of six stability factors.

Durability of market: A basic commodity such as sulfuric, for which there will always be uses, would be rated very good on this factor. On the other hand, a product going into a textile-end use which is starting to become obsolete would rate very poor.

Breadth of market: A product used both nationwide and abroad by a wide variety of customers would be rated very good, while a product used in just one step of a process peculiar to a small number of manufacturers located in the Pacific Northwest would be given a very poor rating, unless this rating could be improved by favorable longterm contracts with reliable purchasers.

Possibility of captive market: An average rating would be given to a product for which there is a potential use within the company but which can be bought from outside suppliers at such favorable prices that the return on investment for our own facilities would be border-

Difficulty of copying: A prod-

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T. T. MILLER was named President of the Polymer Chemicals Division of W. R. Grace when the Division was formed to oversee operations of the Company's polyethylene plant at Baton Rouge, La.

Prior to this appointment, Miller was with Dewey and Almy Chemical Company from 1922 to February 1956 as sales engineer, European Sales Manager, General Sales Manager, Vice President in charge of sales, V-p of marketing, and finally Vice President of the Organic Chemicals Division. Dewey and Almy merged with W. R. Grace in 1954.

uct covered by a strong patent and manufactured by a unique process from intermediate materials produced only by our company would rate *very good*.

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Stability in a depression: A product distinctly in the luxury class where purchases can easily be postponed would be rated very poor, while one that is an essential constituent in staple low priced consumers' perishables should get a rating of very good.

Stability in wartime: A product which would almost immediately be denied allocations of critical raw materials in wartime would draw a rating of very poor, whereas a product which would be in heavy demand as a replacement for other more critical items would be rated very good.

#### Growth factors

Another area to be considered is the growth potential of the proposed material.

Unique character of product or process: A product that can fill an important unsatisfied need or that can rapidly — and without interference — replace a higher priced material should rate very good for this factor.

Demand-supply ratio: Although the product may not be unique, if there is room for a new supplier because the demand is expected to outgrow the supply, it should rate very good so far as this factor is concerned.

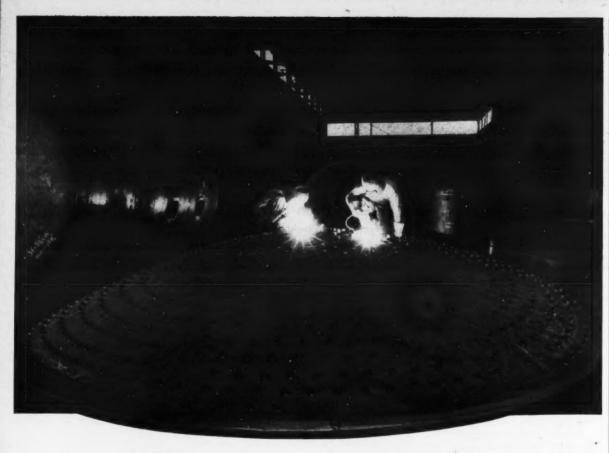
Rate of technological change: 'If there is a wave of change looming up on which this new product can ride, it draws a rating of very good. For instance, our sister division, Dewey and Almy Chemical Company, has successfully timed and ridden such technological waves as the upsurge in scientific weather forecasting made possible by daily widespread use of Dewey and Almy's meteorological balloons. But a product which is merely expected to grow commensurately with the growth of population and of standards of living would get a rating of average in this factor. A product that is fast losing ground technologically would rate very poor.

Export possibilities: If the sales growth of the new product can be markedly accelerated by adding export sales to domestic sales, it deserves a rating of very good.

Utilization of management personnel: A new project would rate very good on this factor if it offered an opportunity to promote potential management talent into enlarged responsibilities, yet did not unduly deprive existing products of their essential management, and did not unduly tax top management's time and effort. For example, the creation within

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STABILITY FACTORS	Very Good	Good	Aver-	Poor	Ve Po
1. Durability of Market			-		
2. Breadth of Market	~	-			
3. Possibility of Captive Market				>	
4. Difficulty of Copyling			/		
5. Stability in Depressions		1			
6. Stability in Wartime	•		•	•	-
7. Unique Character of Product or Process					
8. Demand-Supply Ratio	/	-			
9. Rate of Technological Change		-			
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10. Export Possibilities					
11. Utilization of Management Personnel					
MARKETABILITY FACTORS					
12. Relationship to Existing Markets		EAL	1		
13. Company's Reputation in Allied Fields			-	-	
14. Relation to Probable Competition		<			
15. Ability to Meet Service Requirements	•		/		
6. Relationship to Customer's Products		/		•	
17. Large Volume with Individual Customers	~			•	
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POSITION FACTORS					
O. Time Required to Become Established	3.00			1	
1. Value Added by In-company Processing			<		
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4. Internal Availability of Raw Materials RESEARCH AND DEVELOPMENT FACTORS	•		1.0		
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8. Availability of Research Personnel ENGINEERING FACTORS		-	•	•	
9. Reliability of Process Know-how		•		,	
O. Utilization of Standardized Equipment			/		
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2. Utilization of Idle Equipment					-
3. Utilization of Surplus Utility Capacities		7.	-	-	
4. Utilization and Upgrading of By-products				>	
5. Utilization of Familiar Processes		-	-		
6. Availability of Production Personnel			>		
7. Freedom from Hazardous Conditions	-	-			
8. Freedom from Difficult Maintenance Needs		>			
9. Freedom from Waste Disposal Problems	/		10000		1



### Why the STAYS?

Recently a large user of process equipment needed a 304 stainless steel jacketed autoclave. It was to operate at a working pressure of 110 lbs. per square inch, in the jacketed area.

The answer was a stay bolt construction (they're

what you see in the picture above). This method allowed us to reduce head thickness-a technique that lowered cost considerably. This design also enabled us to improve delivery and conserve scarce nickel.

Users of alloy processing equipment (lots of 'em) are taking advantage of the skills and facilities of Chicago Steel Tank Company.

We can help you, too!

At Chicago Steel Tank Company you'll find a team of specialists that consider unusual fabricating requirements "duck soup." Why not? They're used to them. No problem with rigid customer specifications either. It's all in a day's work.

So when you need fabricated vessels and process equipment of any type or material, call us.

Write for Chicago Steel Tank Company new facilities booklet now. No obligation.



Check 1066 opposite last page.

#### **Product Research**

Starts on page 32

W. R. Grace & Co. of the Polymer Chemicals Division afforded an excellent opportunity for promotion of some personnel with potential management ability from other operating divisions of Grace's Chemical Group. These men could be moved because there were still others who in turn could be promoted into the slots they vacated. At the same time the caliber of talent available and the nature of the polyethylene project were both such that the new venture would absorb only a modicum of Grace's top management's time and effort.

#### Marketability factors

There are eight marketability factors which we look at when determining the potential of a new product.

Relationship to existing markets: A product which can be sold to our present customers through our present sales organization rates very good. A product that requires our understanding of an entirely different field from any we are now selling, requires an entirely different sales organization, or must be marketed through entirely different distribution channels rates very poor.

Company's reputation in allied field: Although prospective customers in a new field may not be the ones to whom we are now selling, if we are highly regarded in an allied field we may nevertheless have an advantage, and the product should be rated very good on this factor. For example, Dewey and Almy built its reputation as a supplier of sealing compounds to the manufacturers of metal and glass containers, and part of Dewey and Almy's new CRYOVAC process for packaging frozen foods was facilitated by the confidence packers had in the division's food preservation test data.

Relationship to probable competition: If other suppliers have neglected their markets

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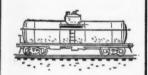
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Storage



Inhibitor Removal



# is yours in full measure when you buy ROHM & HAAS ACRYLIC MONOMERS

Improved end products are only half of the benefits you get with Rohm & Haas acrylic monomers. Because of its longer experience in acrylic materials, Rohm & Haas can also supply more answers on how to handle acrylic monomers.

How broad is this technical service? Rohm & Haas can give sound recommendations on (1) the best

methods of transporting acrylic monomers, (2) how to unload them, (3) how to store them, (4) what to do about inhibitors, and (5) how storage vessels and piping systems should be designed. As a result of this comprehensive service, you can be sure of operating under the safest conditions. For complete information, write today to Dept. SP.

#### **ROHM & HAAS ACRYLIC MONOMERS**

Methyl acrylate
Ethyl acrylate
Butyl acrylate
2-Ethylhexyl acrylate
Methyl methacrylate
Ethyl methacrylate

te Butyl methacrylate
Hexyl methacrylate
Decyl-octyl methacrylate
acrylate Lauryl methacrylate
crylate Stearyl methacrylate
Glacial acrylic acid
Glacial methacrylic acid



Chemicals for Industry

### ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Check 1067 opposite last page.

and handled their trade relations badly, we can give the new product a rating of very good on this factor. If, on the other hand, the other suppliers not only have served their customers extremely well but buy from these customers as much as they sell to them, we should use a rating of very poor.

Company's ability to meet customer service requirements: Since the Polymer Chemicals Division has a modern, well equipped and well staffed plastics application laboratory, a new product would rank very good if its applications could be studied and demonstrated in the same molding, extrusion and coating equipment as we now have. If it were a "first cousin", say, a rubber compounding ingredient, we would rank it good, but if it had no relationship whatsoever to any of the techniques we now master, it would have to be assigned a rating of very poor.

Relationship to customers' products: We would have to rate a product poor or very poor if it were the same type of product our customers make, or if it were a different type but tended to take business away from them or detract from their business profitability.

Large volume with individual customers: When customers buy in large volume, selling and servicing expenses will ordinarily be relatively low; also the larger customers may have adequate evaluation facilities which could be of importance during the development stage. All these conditions will give the new product a rating of very good which can, to some extent, offset a very poor rating in the Breadth of Market Factor listed under the Stability heading.

Few variations or styles required: If it is evident that a new product requires a wide variety of grades, styles and packages that will result in poor manufacturing economics and cumbersome inventories, the product will have

Turn to page 262

Proposals for engineering and scientific scholarships have failed in the past because of the financing problem," says Senator George Smathers. Here's a proposal that will provide \$3 million or more in educational aid without costing the taxpayer one red cent. Read what the plan's sponsor has to say about . . .

# Financing Scientific Education with Seized Enemy Assets

SENATOR GEORGE SMATHERS

THERE is a desperate need for the prompt approval and enactment of legislation to encourage the youth of the Nation in the field of scientific endeavor. A cool, fair, and objective evaluation of world conditions today reflect that the Soviet Union is already in the advance stages of building a weapon far more threatening than the intercontinental ballistics missile or the H-bomb. Soon Russia will possess this weapon in sufficient numbers to permit it to embark on the road toward world domination without the necessity of having to fire a single missile or drop a solitary bomb. What is this weapon? Scientific manpower!

Today, the Soviet Union is graduating over twice as many engineers and scientists as the United States each year. According to a recent report issued by the Joint Committee on Atomic Energy, Russia now has an estimated 890,000 trained scientists and engineers, compared to approximately 760,000 in the United States. In the Soviet Union today, 50%, or approximately 543,000 college students, are engaged in the study of science and engineering, compared to only 15%, or approximately 375,000 students, engaged in these fields of study in the United States.

Regardless of whether or not we entered the scientific manpower race with the Soviet Union voluntarily, we are, even now, fighting for our lives. It is perhaps true that we would have had a shortage of scientists and engineers even if there were no threat of communist domination.

As Admiral H. G. Rickover pointed out recently, "It is a truism needing no elaboration that as society becomes more complex technologically, it needs proportionately more, as well as qualitatively better, trained professionals. Thus, while the population of the United States has doubled in the last 50 years, the number of its professional men and women has quadrupled. We have, today, five times more engineers and ten times more scientists than we had a half century ago, and yet there are still not enough. To increases our national product by a given percentage annually, we must increase our scientific and engineering personnel almost twice as fast. With every step forward in technological progress, the nation becomes more dependent upon its

trained brain power."

Soon, if not now, the Soviet Union will harvest a new and most valuable surplus crop of trained scientists and engineers ready for export anywhere in the world. These technicians will carry Russian know-how, language, and equipment into critical areas such as the Middle East. A country importing this crop will undoubtedly get it free. And it will also get free communist propaganda, intrigue, and subversion.

Where are we, who traditionally are better prepared, better endowed, and better suited to help mankind? The situation is not pleasant to contemplate. The United States does not have enough scientists to satisfy its own needs, as can be seen in any want-ad column in the nation.

### STATUS OF ENEMY ASSETS

Enemy assets were estimated to be worth \$375 million when seized. Today, their estimated value is near \$600 million. American Prisoner of War or other claims have taken \$225 million. Approximately \$50 million was used for administrative expenses. This leaves a balance of around \$325 million.

Some of this must be held in trust until

property suits in litigation are settled. Other sums are necessary for operating expenses. Of the \$325 million, somewhere between \$100 'and \$125 million deposited in the Treasury is immediately available to finance the scholarship plan proposed in Bill 5727.

Legislation calling for return of these assets in full would cost the American tax-

payer about \$600 million. Added to this is the \$225 million already paid out, plus \$50 to \$60 million in administrative costs. Payment of American war losses would cost around \$400 million more. Thus, the total cost to the taxpayer for return of alien assets would be approximately \$1 billion.

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GEORGE SMATHERS received his bachelor and law degrees from the University of Florida. He was voted Outstanding Young Man of Miami in 1940, while serving as Assistant District Attorney.

At the outbreak of World War II, Smathers was assigned to organize the first Enemy Alien Control Board for the Justice Department. He entered the Marine Corps in 1942 and served until the end of the war.

In 1945, Smathers was elected Democratic Congressman from the Fourth District of Florida (Miami area). He was reelected in 1948 and named Outstanding Young Man in the United States Government by the Junior Chamber of Commerce.

In 1950, Smathers was elected United States Senator from Florida. He was appointed to serve as Deputy Floor Leader and served as Acting Majority Leader during the absence of Lyndon Johnson.

Senator Smathers served as chairman of the Democratic Legislative Review Committee, and has been a member of the Senate Small Business, Interstate and Foreign Commerce, and Finance Committees.

We are short all along the line. We do not have enough teachers or professors; we do not have enough classroom or laboratory space in our colleges and universities. Government, industry, and educational institutions all compete for the same individual—the scientist, the engineer, and the technician able to supply the technological know-how necessary to maintain and advance our economy, and to safeguard a free world.

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Some eminent scientists, such as Dr. Edward Teller, the man given much credit for the development of the H-bomb, predict that scientific supremacy will pass from the United States to Russia within ten years. But I am firmly convinced that if we act now, we can achieve and maintain supremacy in the

needed fields of endeavor so vital to our own national security and economic well-being.

I recognize that the scientific manpower problem is not an easy one to solve. This is particularly true since, unfortunately, we cannot push a button to start up an automated production line and have a given number of finished scientists pop off the other end, as we can automobiles and washing machines. We all know, too, that scientific training is long, hard, and costly, but we can and must find ways to solve the critical shortage. We can at least start to give needed incentive and help solve the problem by enactment of legislation which I have recently introduced.

In the 84th Congress, various proposals were introduced, designed to provide scholarships in these highly technical fields, none of which were enacted into law. This legislation failed for a variety of reasons, but I feel sure the money problem was the principal reason.

I am confident that my proposal, Bill S727, entitled "Veterans' Childrens' Scholarship Act", will answer most all of the objections which this type of legislation encountered in the past. This legislation would, in my opinion, make the most appropriate and beneficial use of funds resulting from the wartime vesting of enemy property. By authorizing the National Science Foundation to use the interest resulting from the investment of such funds by the United States. an estimated \$3 million would be provided for engineering and other scientific studies. More

than that amount would be available after the program is in operation. In the first year, approximately 1500 scholarships could be awarded.

The bill is a reasonably simple one, and is designed to use existing government facilities, avoiding the necessity of setting up any new agency. Briefly, the bill makes the following provisions. An amount of 100 to \$125 million of funds vested by the United States under the Trading with the Enemy Act would be made immediately available to the Secretary of the Treasury for investment in interest-bearing securities of the United States. Provision would be made for continued transfer of additional funds for investment as fast as they become available. The result-

Turn to page 264

# THE SMATHERS PROPOSAL In the smathers propo

Even with unscheduled siestas, phone systems that don't work well, and countless other hazards unknown to US researchers, you can still do a creditable job of ...



# ... the Latin American way

ROGER WILLIAMS,

Jr., President Roger Williams Technical & Economic Services, Inc.

More and more United States companies are looking at Latin America as a possible area for expansion. After all, last year we shipped some \$350 million worth of chemicals and allied products into Latin America. When the shipments for any single item get big enough, there is obviously an incentive to produce locally — for tax reasons if no other.

Equally obvious, economic studies are necessary before any decision is made to build a plant in Latin America - and these include market studies as well as plant costs and operating costs. For example, a private investor built a button factory in Nicaragua. As the New York Times put it recently, "Two months later it was discovered that the plant already had produced more buttons than the entire national economy could absorb in three years and the enterprise quietly expired."

In many ways Latin American economic studies are more complicated than comparable studies in the United States. As a percentage of capital involved, they will cost more for a number of reasons - some of which will be outlined below. On the other hand they can be fascinatingly different from carrying out similar studies here. Call it a change from the old routine if you will. After all it is somewhat different when the man you are interviewing about current and future markets is carrying a .45 on his hip. That's rare, but certainly less rare than in the United States. It's also a change to have an interview interrupted to examine a .308 Mauser rifile just captured the day before from a revolutionary expedition.

Suppose we consider market studies first. The obvious starting points are the Bureau of Foreign Commerce of the Department of



"... two months later the plant had already produced more buttons than the entire national economy could absorb in three years ..."

Commerce and the United Nations. At least they can give you statistics — but. It is probable that the statistics from the two sources will widely disagree. So then you go to the commercial attaché of the Embassy of the country or countries you are considering. You get a set of figures which don't agree with either of the first two. Good start.

Presumably you have picked up some names of people you ought to talk to in the countries involved from the previous sources, so you get travel and hotel reservations and head "South." "I ought to wrap this up in a week," you tell your boss. If your company is already exporting to those countries, you

are also armed with letters of introduction to your importers there. No problems ahead.

So you fly down, get through Customs with little trouble, get to your hotel and find it air conditioned and more modern than any United States hotel you have ever been in. You relax a bit and decide to call room service for a small libation. There your troubles begin, because after about two hours you wonder what happened. So you say to heck with room service and go down to the bar.

The next morning you are up bright and early, get breakfast (with Americano or Turista coffee) and get set to phone for appointments. No trouble with



". . . it IS somewhat different when the man you are interviewing is carrying a .45 on his hip . . ."

the hotel telephone operators; they all speak good English. But nobody answers on the other end. Ultimately you realize that nobody comes in until ten. Finally someone does answer, but the guy you want is tied up; he will call you back. He never does. By noon you have been able to talk to one contact, and he can meet you a week from Thursday for lunch at the X Club. By this time most UC chemical market researchers are "shook up" to put it mildly.

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So you have lunch and decide



"... then you get a set of figures that don't agree with the first two..."

that at least you can see some bankers. You are quietly informed they will not be back until three. Nor will anyone else that you want to call. But finally that afternoon you are lucky. Mr. Y will see you at ten the next morning at his office. You get up the next morning bright and early, eat breakfast (with Americano or Turista coffee) and head for Mr. Y's office. By eleven o'clock you are beginning to wonder if Mr. Y strolled in front of one of those crazy taxies. At quarter to twelve he comes in, in a rush, to suggest that you and he go out to lunch at the Z Club. You stagger back to the hotel at four, wondering what hit you, and write down what little you learned. If Mr. Y was an importer of one of your products, he is probably also importing from one of your competitors so he probably won't tell you anything — for fear you might cut him off.

Now all of this might sound



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like our Southern neighbors are inefficient business men. That is not true in the slightest. They just do business in a different way than we do in the United States. The chemical market researcher who works in Latin America has to realize the differences — and adjust himself to them. Once the adjustment takes place, market research in Latin America can be rewarding and interesting. (It took the author two trips and six months.)

The next thing you learn is that to reach the men you want to see may take devious means. If you are studying liners for multiwall paper bags, you may be better off to start with a banker, who refers you to a paper printer, who refers you to a paper maker, who refers you to a paper maker, who refers you to the bag manufacturer. "Cold calls" as we refer to them in the United States are almost impossible.

In the United States you can be rather blunt with some of your questions. For example, you can ask a purchasing agent how much epoxy resin his company used the previous year and is going to use this year, etc. You may not get an answer, but you don't offend the purchasing agent because he is used to that type of question. In Latin America you would probably be thrown out the nearest door for even asking such a question. The Latin American just isn't used to that type of questioning.

The net result is that your questions often are not straightforward, and you have to go around Robin Hood's barn to get the answers you want. It means also that your final report on a market is going to be based more on the judgment and intuition of the people doing the study; less on solid facts than a similar study here.

Production economics can have their problems, too. For example, we were studying the economics of a plant in Cuba which would use considerable quantities of steam. Now there are sugar mills all over Cuba with boilers which are idle some eight or nine months of the year. So we those same boilers during their otherwise idle time, the operators would demand and get the same hourly wage as when the sugar mill was running on cane. If you put up your own boilers to run year round, labor cost would be cut to one-fourth or less.

Tariffs and national pride are other things to contend with. Too many of us in the United States automatically say to ourselves that no plant of less that X capacity can be economic. We forgot that when you are producing in a Latin American country you can have tariff protection and tax exemptions that can mean a lot more than the differential in plant size. Tax exemptions will

may be ridiculous. Trying to explain that to the United States company may be impossible — they just won't listen.

Another thing to remember about some Latin American countries is that they are plagued by unemployment. That is why so many of them are passing tax laws which are very favorable to foreign investment in their countries. They are actively trying to attract new industry. Our own Puerto Rico's "Operation Bootstrap" is a perfectly good example, as is the trade union grouping of five of the Central American republics.

On the other side of the coin, in many places once you have hired an employee and had him for about six months, you have



ROGER WILLIAMS heads his own firm of consulting chemical market research and economic studies, with headquarters in Princeton, New Jersey. Because of the amount of work his firm has been doing in Latin America—in such countries as Cuba, Mexico, and Venezuela within the last year—a subsidiary, Roger Williams Technical & Economic Services, S. A., has recently been set up to handle such studies. Its main offices are in Havana, Cuba.

thought we would tie up with one, save boiler installation cost, and only operate eight months. The storage facilities so we could sell year round would be cheaper. That was before we reckoned with the labor laws and unions. Since the sugar mills only operate part-time, during the "Zafra" as it is called, the workers are paid well even by United States standards on a per-hour basis. On a per-year basis, since they only work two or three months a year, the payment overall is small. But, if you were to run vary widely between countries, but they are not to be sneezed at. Here again is an area that is not usually covered in a chemical market research study in the United States, but has to be studied in any foreign work.

As a matter of our experience, one of the problems involved in Latin American work is that a company will say we cannot build a plant that is economic unless it produces so many pounds of product per year. Considering local labor costs and protective tariffs this statement



"... in Latin America you would probably be thrown out the window for even asking such a question ..."

hired him for life. Practically speaking, you cannot fire a man — not because you might have a strike by the union as you could have here — but because you are prohibited by law from laying the man off. I doubt if many executives would want to be in a Latin American "pokey."

All this is in no way meant to discourage Latin American investment by United States firms. To the contrary. The opportunities are there - probably many more than there are here. The purpose is to point out that the usual studies done here before a management decision to build a plant are not enough. The studies required are more difficult to do to get the same market and economic information, and considerable additional information on things like tax law and labor laws should be investigated. In other words, be forewarned.

How good is your company's research program? What's the necessary technique to insure its success? Is it planning the research program in advance? Or, is it selecting fruitful areas to research? What is management's responsibility in approving a research program? Here are the answers from two experienced research directors.

# IMPLEMENTING A STRONG

In spite of the rocketing cost of research today, every manufacturing firm worth its salt supports a substantial research and development program.

Interestingly, the question asked now by management is "Can we afford not to do research?" The picture has completely changed from 25 years ago. Even well into the 1920's, ca in war and peace. In the second World War it was discovered that crash programs using massive well-managed research and development programs could master tremendous problems in a short time.

Technical innovations are influencing most products now manufactured by American industry. For example, within the

Most companies are aware of this need and accept the inevitability of spending a measurable portion of each sales dollar on research and development. What is not so readily accepted is that mere support of research will not in itself guarantee a company's future health. A laboratory following the casual, informal management procedures of the 1920's will be outclassed by one employing the tight-knit, streamlined industrial research techniques possible in 1957.

Today there exist several prerequisites basic to a successful industrial research and development program. Only by careful attention to all can practical results be achieved, considering expenditures involved.

Most people would likely assign prime responsibility for profits from research and development activities to the research director. We do not feel this is correct. The burden must be shared by top corporate management, the research director, and the research staff.

#### Management Responsibility

As a prime requisite, it's management's job to spell out corporate aims and hopes in such lucid language that the research department is able to plot its course intelligently. Also, management must discharge a second responsibility in keeping the research organization aiming at the main objectives of the company. Diffusion of effort over the entire area of industrial activity must not be permitted.

In decisions on research projects, management must also accept much responsibility for judging commercial feasibility of the project. Recommendations can be supplied by market re-

search specialists.

When management approves a research project, it should be stating in substance that if laboratory research is favorable, it has serious plans to follow through and commercialize the new development. Under this policy the laboratory staff should be confident that, if promising technical results are forthcoming, the project will be given every opportunity to mature into a commercial reality.

As a logical sequence to this, management must make certain the proper attitude exists in the company toward research and research developments. Management cannot tolerate - among its ranks in production, sales, or other key spots - negative attitudes toward research or technological development. These proper attitudes are essential because many of these key men will have a substantial chance to aid or hinder progress of the development.

Management must provide guidance, organization, and facilities to convert a research result into profit. A laboratory cannot supply adequately all of the manufacturing, engineering, and economic skills, required to exploit a technical development fully. To achieve maximum utilization of research talent, the men

DR. EMIL OTT, received his D. Sc. Nat. (Ph. D.) degree from The Swiss Institute of Technology in 1927 and came to the United States the same year. His early career included chemical development work for Stauffer Chemical Co., and Hercules Powder Co., and teaching at Johns Hopkins University. He was made Director of Research for Hercules in 1939 and joined Food Machinery and Chemical Corp., as Vice President Research, Chemical Divisions, in 1955. He is a member of many national and international societies and served on Board of ACS 1948-1950.

organized research by industry was the exception. Today the research director, formerly isolated in a remote corner of the plant and largely forgotten by top management between annual budget sessions, is a full-fledged member of the management team.

What accounts for this drastic up-grading of industrial research? The chemical industry was taught during World War I that industry based on chemical research was essential to Ameri-

past three years, Food Machinery and Chemical Corporation has introduced completely new processes for production of two old chemicals, carbon bisulfide and soda ash. If such basic chemicals are susceptible to major technological change, imagine the vulnerability of many less mature chemical products to improved processes as well as replacements. Paraphrasing "Alice in Wonderland," we will have to run ever faster to stay in the same place competitively.

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# RESEARCH PROGRAM

EMIL OTT,

Vice President Research, Chemical Divisions.

And

CARL F. PRUTTON,

Executive Vice President
Food Machinery and Chemical Corporation

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#### Research Director Responsibility

While the research director, as a member of the management team, must accept his share of the preceeding responsibilities, other obligations he must bear alone. To a marked degree, he will influence the attitudes, work habits, morale, the entire tone of the laboratory. The director, more than any other individual, will determine the day-to-day performance of the staff. Consequently, he must accept ultimate responsibility for the accumulative output of his staff.

More specific responsibilities must be assumed by a research director in making a dynamic program possible. His staff must be technically competent and contain a sufficient sprinkling of truly creative individuals. These will provide the essential ideas needed to spark a vigorous research effort. The research director must give attention to a thousand and one things, ranging from "time clocks" to salary reviews, from attendance at meetings to order of names on publications. Any item taken separately may appear trivial, but in total they spell "morale."

To assure maximum productivity from his laboratory, the research director must have a high degree of selling acumen. First he must sell management's

policies to his staff; conversely, he must sell the results of his staff to management. The tasks are difficult and ulcer-forming. Incongruous as it sounds, the direction of research is more an art than a science.

#### Staff Responsibility

In assigning responsibilities, we finally come to the working scientists and engineers. They must accept certain obligations. They are in the best position to map out specific routes to seek desired goals. This responsibility should be vested in them 100%.

Another responsibility of the individual scientist is that he view his technical results objectively and dispassionately. In deriving the greatest practical method from a research program costing today some \$20,000 per professional man-year, the luxury of continuing projects cannot be afforded if they have been given a fair trial and found wanting. The cleanest way to prevent this happening is to foster the utmost objectivity in the scientist himself. If the individual clearly understands that he is largely responsible for making a proper decision on faltering projects, half the battle has been won.

The final duty of the working scientist and engineer is the responsibility for originating a goodly number of novel proposals and ideas. Good ideas can and do come from many sources. One of the most likely is the researcher himself.

Selection of Fruitful Areas for Research

Usually an area for research should be chosen which draws on the strength of the existing business, whether it be an excellent raw materials position, broad manufacturing knowhow, a strong sales force, or numerous other factors.

effect on the nature of the research program to be implemented. If additional basic knowledge is demanded, research must be of a fundamental, scouting character. This type of endeavor requires the greatest soul-searching because it automatically demands a patient long-range program. However, there are advantages. Competition is not so

DR. CARL F. PRUTTON, graduated from Case Institute of Technology in 1920. He served as head of Case's Department of Chemistry and Chemical Engineering from 1936 to 1948 when he joined Mathieson Chemical Corp., as Director of Research. In 1954 he became Vice President of Food Machinery and Chemical Corp., and Technical Director of FMC's Chemical Divisions. He was named Executive Vice President in 1956. In addition to membership in many technical societies, Dr. Prutton is co-author of "Principles of Physical Chemistry"

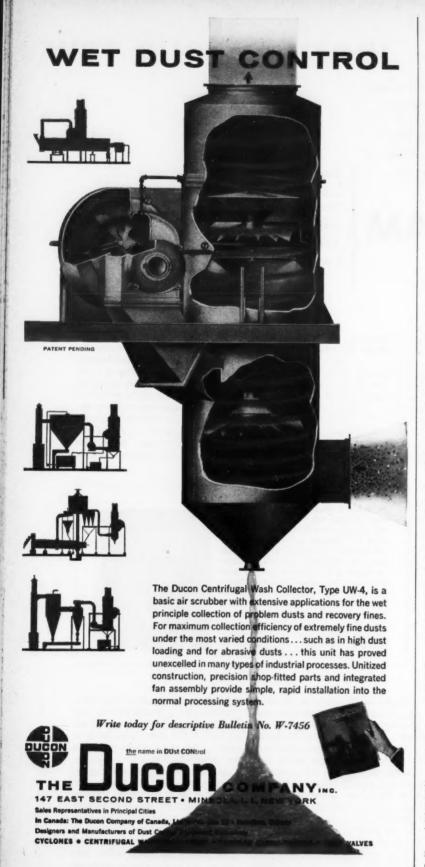


In picking a field for research we cannot over-emphasize the importance of choosing a sector which fits the company's objectives. To be really worthwhile there must be opportunity for synergistic action: the research activity should draw strength from the parent organization and later return that strength with interest so the integrated result will be greater than had the two operated independently.

The particular choice of research area will have a striking great so rewards are likely to be considerable. Furthermore, an unexpected side road may show up along the way and lead to results far more lucrative than the original goal.

At the other extreme is a short-range target where all scientific facts on hand, require only a novel combination to achieve the end result. This does offer the hope of capitalizing on research in the shortest period of time. But this conservative ap-

Turn to next page



Check 1068 opposite last page.

### Strong Research Program

Starts on page 40

proach limits the chance of a lucrative strike. Usually a compromise solution leads to a research program involving several short-range projects, a small number of intermediate range, and a few long shots which if they mature could represent a real bonanza

#### **Physical Facilities** and Personnel

Offsetting factors which mitigate the burden of pioneering a new development are the remarkable new research tools and techniques available today. The electron microscope extends man's vision. X-ray and electron diffraction permit deep insight into the elementary latices of matter. Radio tracers enable experiments to be carried out that were impossible of fulfillment in the pre-atomic era. Digital and analog computers enable the scientist to tackle problems which could not be solved in one's lifetime by pencil and paper mathematics.

It must be obvious that the laboratory boasting these skills and techniques has a tremendous advantage over companion facilities not so equipped. Consequently, the company which is unwilling or unable to furnish its staff with this admittingly costly physical equipment is penalizing itself to a marked degree. The company will encounter rough sailing in competition with those laboratories possessing these tools.

A corollary to the problem of modern laboratory equipment is the acquisition of specialists to operate these de-

Today's technical manpower shortage is familiar. Even more acute is the shortage of personnel trained in certain specialized disciplines.

There is also a crying need for supervisors and group leaders capable of integrating individual efforts within the laboratory into a unified

This shortage industry itself must solve. No university has or will ever turn out finished



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#### Planning the Program

In fostering idea conception, an atmosphere conducive to creative thinking is desirable and helpful. Equally important, there should be concrete aids to nail down ideas as they rise.

One help is encouraging each scientist to reduce to writing his ideas as soon as they occur.

Careful consideration by a local Inventions Committee will speed the flow of grist for the research mill.

Maintaining smooth communication channels between laboratory and other departments will enhance an influx of ideas from other groups. This is a particularly good way to turn up leads on new products for the market place.

Brainstorming sessions can be of definite value in drawing out scientists reluctant to express their thoughts freely for fear of ridicule.

A further way is to allot ten to fifteen percent of each scientist's time for preliminary experimentation on his own ideas without requiring that he seek authorization for this activity beyond his immediate superior.

#### Pre-Project Evaluation

The second stage of planning a research project is a firming-up process — preliminary evaluation. An Inventions Committee can help separate the wheat from the chaff. Other ideas will fade away when a few experiments are

At last a hard core of seemingly worthwhile suggestions will be left. In our organization the surviving ones are then put through a second screening by way of a project proposal form. This requires the author to give the best available answers to the major technical and economic factors involved.

The research proposal form used by FMC is divided into

Turn to page 268

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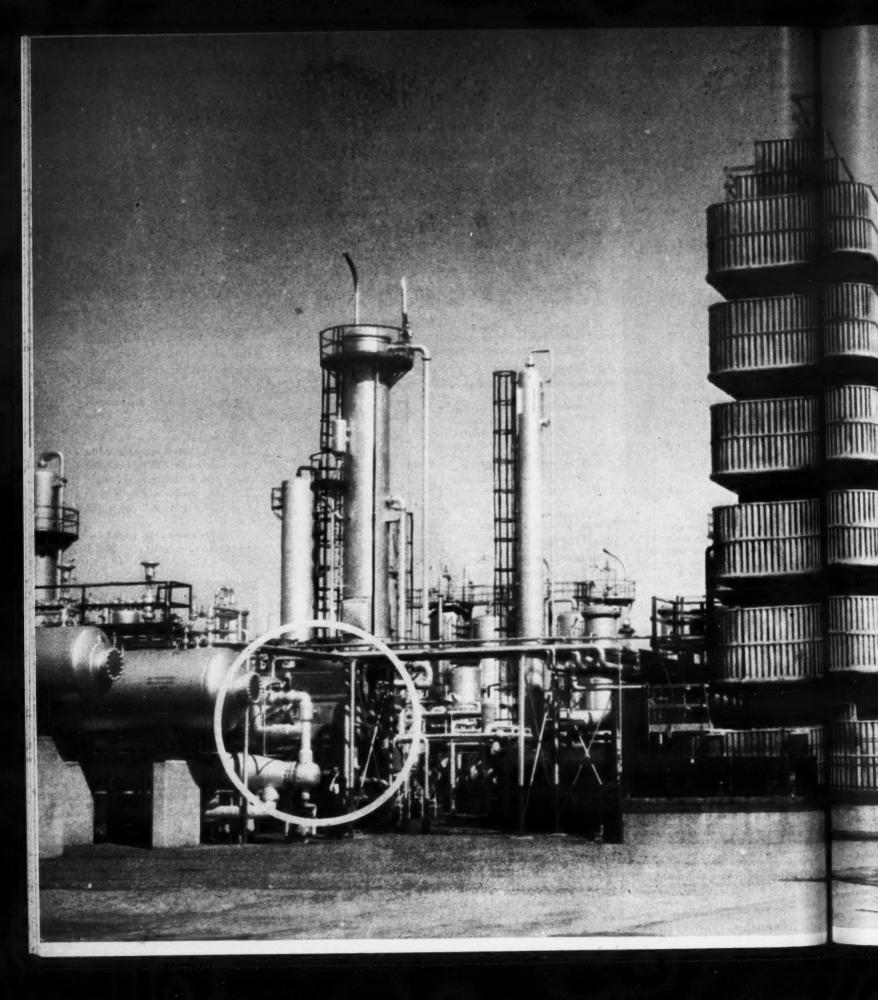


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Heyl & Patterson's Cyclone Brochure C-954 available upon request.

Check 1070 opposite last page.



# Increases cooling capacity at smallest additional cost

Package unit, complete with mist eliminator, handles four products at once at absorption plant

JACK L. STAIR
Division Superintendent
T. F. G. BOYD
Division Engineer
JOHN ANDERSON
Engineer
Union Oil Company
of California

As reported by CP staff

Solution: Engineers decided to install a packaged evaporative cooling unit. Working in conjunction with a cooling tower manufacturer, they conceived the idea of combining an evaporative cooler with a dry-air fin-tube unit. All four of the products to be cooled would flow simultaneously through this combination unit.

PROBLEM: Erection of new

fractionation equipment required

additional cooling tower facilities

at the Battles Absorption Plant of Union Oil Company, located

near Santa Maria, California.

Four products had to be cooled.

Space was limited, so equipment

had to be compact and efficient.

Here's how the evaporative cooling tower operates:

Wet gas (gasoline-laden gas vapors) from wells is conducted to the absorption plant, compressed and cooled. Part of the readily liquifiable gasoline load is removed as result of this cooling. The compressed gas, still containing some gasoline and other liquid petroleum components, is then counterflowed through "lean oil" — a light petroleum oil, whose function is to absorb the remaining liquid petroleum fractions.

This lean oil and gasoline mixture is then distilled. The gasoline vapors which are stripped off are cooled in the evaporative cooler, condensed, and processed into butane, propane, and stable gasoline. The dry gas is sold to a gas company through a connection to a nearby transmission line. The lean oil, after stripping, is cooled in the same evaporative

unit, and returned to the absorption system for re-use.

In more detail, here is how the single evaporative cooler is used for four cooling jobs:

1) Wet gas from field is cooled before introduction to lean oil absorption. In addition to obtaining gasoline, this cooling also drops temperature of gas to the range of the lean oil, to facilitate better absorption.

2) Gasoline vapors obtained by absorption are condensed and cooled, first by passage through top section of cooler, then through old towers for further cooling, then is returned through the bottom section for final dropping of temperature.

 These gasoline vapors and condensed raw gasoline then return to the bottom section of the cooler for final dropping of temperature.

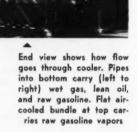
4) Lean oil, after being stripped of gasoline and dry gas in distillation column, is partially cooled in old towers and then receives final cooling in new evaporative cooler above.

Entire heat exchange operation has been balanced so that proper heat load is obtained for each product in a continuous flow.

#### Details of Evaporative Cooler Design

Cooler is divided into two sections horizontally. Bottom section is water cooled, and consists of three separate tube bundles which handle wet gas, raw gasoline, and lean oil. Top section is air cooled and consists of one

Turn to page 68



Minimum space occupied by cooler (unit directly behind man) reflects economics of installation. Package unit was delivered, set on slab, connected, and was ready to go DR. WOODWARD received his A.B. from the University of Michigan in 1937, and his M.D. from the University of Virginia in 1943. He trained in psychiatry at Payne Whitney Clinic of New York Hospital. He was on the teaching staff of Cornell University Medical School in the Departments of Psychiatry and Public Health and Preventive Medicine before coming to American Cyanamid in 1947. He continues to teach at Cornell Medical School, and sees outpetients at the Payne Whitney Clinic.



Employees leaving Lederle Laboratories Div. of American Cyanamid. Plant has 4000 personnel in many categories

All humans have feelings of anxiety. Without anxieties we would not have enough motivation to invent, or make the progress of which we are so proud. If anxiety is controlled it is very useful and can be an asset. If it is not controlled it can be dangerous and costly.

# Industrial psychiatry can pay dividends

As told to TED WETT, Assistant Editor

By DR. W. D. WOODWARD, Chief of Psychiatry & Mental Hygiene

American Cyanamid Co., New York, New York

Preventive psychiatry in industry has been making a hopscotch course since the early part of the century. Today there are only four or five companies in the United States employing a psychiatrist full time. The program at American Cyanamid was inaugurated in 1947 in the medical department. At that time, Dr. Woodward was employed on a oneyear basis. The program proved so successful that it was made a permanent part of the department. Dr. Woodward's central office is in New York City, but he makes regular trips to plants in order to see patients in consultation or to discuss patients with their local doctors. He has been able to establish contact with good psychiatrists in each location, to whom patients may be referred.

The Cyanamid insurance policy has been revised so that employees can be sent to a good private psychiatrist for treatment when necessary. This insurance will pay up to 80% of the cost.

The doctors of the various medical departments actually carry the full load of the program, but there are enough acute complicated problems for Dr. Woodward to have a full-time assistant. The cost of hiring an engineer, a chemist, or even a file clerk is not negligible by any means. Hiring and training of certain types of personnel can cost several thousand dollars. If an employee becomes emotionally disturbed and leaves his job for this reason, it represents a real financial loss in addition to a loss of whatever skills that person had at his disposal.

Efficiency within a department rises and falls with changes in morale. The supervisor, department head, or group leader, to do his job well, must be a good practical psychologist. He can, and does in many cases, get to the "bottom" of a drop in department efficiency or increase in absenteeism. However, a man's problems at home and in the community are not easily dis-

cussed with his superiors although they greatly affect his working ability, the production level of his department, and the cost of running a business.

These cases, employment turnover and department (and employee) efficiency, rest heavily on the individual's emotional adjustment. The company is rarely aware of emotional illness which is present in employee groups. Cost of these disturbances is never specifically pinpointed on the ledger sheet, but it is real... and high.

It is hard to evaluate the actual "cash value" of a psychiatrist in a company. He is primarily present to do a job for the employees. But in helping the employee, he also benefits the company. It should be clearly understood

that no psychiatrist can, by means of a few interviews, definitely classify where an individual should be placed or how far he can go. Many disturbed people are holding down responsible jobs and doing them quite well. They may have some theoretical psychiatric imbalance which does not disturb them usually and which may be quite useful in their work. If such a person, under pressure from his job, his home, or from within himself, develops symptoms of anxiety it is quite possible in most cases to treat him effectively with short-term psychotherapy while he continues his job. This represents a concrete saving in time and money, both to the individual and the company. Leaving financial benefit to the company aside, his job also represents

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The industrial medical program cares for patients who are physically hurt or become Il during their working day. A general more or less normal pattern exists of people who have psychosomatic illnesses such as colitis or migraine headaches. However, the nurses and staff physicians are psychiatrically orientated enough to note when a certain department starts producing an unusual amount of patients with these illnesses or other symptoms from an emotional imbalance. These patients are referred to the psychiatrist who can then learn the reason for an increase in tension and anxiety within that department.

If turnover in a department becomes high, the supervisor or the personnel department may ask the psychiatrist to

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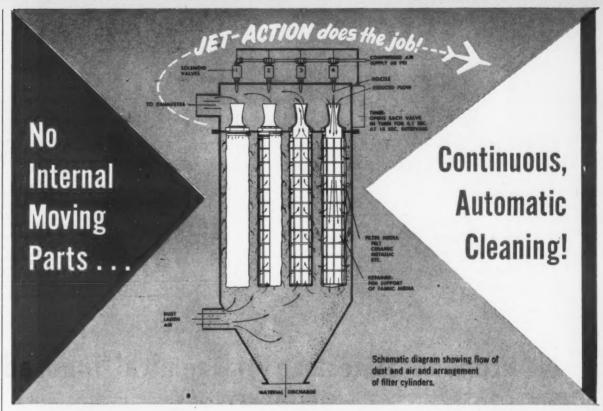
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#### Psychologist, psychiatrist, and psychoanalyst

The psychologist searches for a scientific understanding of how people see, hear, learn, feel, and express their emotions. In applied psychology he uses his knowledge to advise businessmen on how to provide better working conditions or help people live happier and more efficient lives. He is almost never an M.D. and may practice in any state without a license.

The psychiatrist is also interested in human psychology, but as a physician attempting to understand and treat people. He is an M.D. who is trained clinically to deal with people and their emotional problems. A psychiatrist must be licensed in each of the states in which he practices.

The psychoanalyst is a particular tind of psychiatrist. Except for a few "lay analysts" admitted to practice in earlier days of analysis, he is also an M.D. He treats mentally ill (deeply troubled but usually rational) by using the type of treatment developed by Dr. Sigmund Freud or one of his followers. These programs are not alike in methods. He listens as the patient talks freely about personal problems until a pattern becomes clear.



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Check 1071 opposite last page.

It is of utmost importance for all who make materials that enter foods — such as flavor components, colors, and preservatives — to consider in detail the problems of . . ,



Dr. Bernard Oser is a member of the Food Technology Sub-committee of the Food Protection Committee of the National Research Council, the Committee on Food Additives of the Institute of Food Technologists, the Committee on Chemicals introduced in Foods of the Food and Nutrition Section of the American Public Health Association, and The Sous Commission on Antibiotics in Foods of the Commission Internationale des Industries Agricoles. Dr. Oser received his Bachelors and Masters degrees from the University of Pennsylvania and his doctorate in biochemistry from Fordham University in 1927. Since graduation, he has specialized in the fields of nutrition, toxicology, food technology, and the scientific aspects of food and drug laws.

# economical testing of chemical food additives

BERNARD L. OSER
Vice President and Director
Food Research Laboratories, Inc.
Maspeth 78, New York, N. Y.

One thing that's certain is that any eventual legislation that deals with controlling chemical food additives will require toxicity determinations. These can cost a fortune, or — if legislation is framed wisely — they can be made at a reasonable cost.

There are about 500 recognized chemical food additives. Of these, approximately 300 are classified as flavoring agents and about 200 are other compounds, such as colors and preservatives.

Food and Drug Administration Commissioner George P. Larrick describes 150 of these 500 as being is a "scientific no-man's land" with respect to our knowledge of their safety when used in foods. This statement has recently touched off much controversy as to just what toxicity itself really means.

All of the various bills that have been proposed and are now under consideration have one thing in common: They state that food additives must be safe under the conditions of intended use. This means that the old unworkable and abstract doctrine of determining a chemical's toxicity in food by its toxicity in massive doses to animals will be replaced by a realistic determination of whether a chemical is harmful in relation to the amounts and the conditions under which it will be used in foods.

How to attain this goal as economically as possible presents a problem.

#### Testing New Chemicals

On new chemicals to be used in foods, and on which prior or prolonged use cannot be established, the usual requirement for chronic toxicological investigations covers at least two species of animals. Along with the accompanying physiological and pathological observations, these tests are so costly that often it is difficult to justify them on economic grounds. Fees for chronic toxicity studies can run to many times the total annual sales of a given product of any one company - in fact they might exceed the total dollar volume of all producers.

One solution might be for all companies interested in a single compound to sponsor cooperative investigations. This might be justified when need for a compound is sufficiently great and sales potential warrants the expense.

To do this, suitable identity specifications would have to be established, and each manufacturer's product would have to conform. Toxicological studies could then be made on a composite sample. If use were approved, then only such products as conformed to the specifications would be considered acceptable for use.

Another alternative would be for the FDA to permit toxicological tests to take a form other than conventional chronic studies. Nintey-day feeding tests, using a sufficient number and species of a n i m als, might be considered acceptable. In cases where results were inconclusive, longer, chronic studies might be required.

The use of short-term investigations might depend on whether the final use of the chemical additive were sporadic or frequent, and on other conditions of use.

#### Low-cost Testing Methods

In some instances, relatively short metabolic exepriments might replace chronic feeding studies. There is much literature on the metabolic fate of various classes of organic chemicals.

Experiments that demonstrate that compounds are either hydrolyzed, oxidized, conjugated, or otherwise converted to normal metabolites or into recognized nontoxic compounds might be expected to be as good as long-term feeding studies.

For example, citric, succinic, malic, lactic, acetic, acetoacetic, butyric, and other acids are normal intermediates of carbohydrate and fat metabolism. Hence, evidence of hydrolysis and intestinal esterases of the simple aliphatic esters of these acids would be strongly indicative of nontoxicity.

A normal defense against foreign chemicals in the animal organism is conjugation or combination with substances which are readily available in the human body, such as acetic, glucuronic, or sulfuric acids or with glutaof the product utes va toxicolo The benzald

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The United States Congress, at the time of this writing, is studying legislation that will control the use of chemical food additives. The main problem that confronts these law-makers is how to determine toxicity: Tests must prove that a food additive is safe for its intended use, yet must be realistic. Tests could cost a fortune, or — if legislation is made wisely — they can be made at a reasonable cost.

The Editors

mine or cystine. Measurement of the excretion of these end products of metabolism contributes valuable information along toxicological lines.

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The metabolic conversion of benzaldehyde to benzoic acid and its excretion as hippuric acid suggests additional applications of a biochemical approach to toxicological evaluation. The similarity of the metabolism of sorbic acid to that of caproic acid, a normal food constituent, was considered acceptable evidence of its nontoxicity.

Another metabolic procedure involves the analyses of body tissues or of urine and feces to establish the degree of absorption or retention of suspected toxicants. Complete elimination in unchanged form, while not conclusive proof of non-toxicity, provides strong evidence of non-cumulative effect.

Mention must be made of the use of radioactive-tracer techniques as well as the more conventional analytical procedures used in this connection.

Finally, as a means of amassing toxicological data on food additive chemicals, the testing of composite samples may be cited. Here advantage is taken of the

chemical and pharmacological similarity of compounds within a given organic class such as alcohols, esters, hydrocarbons, etc.

The likelihood that they would not interact with each other and would function additively rather than synergistically forms the basis for testing them pharmacologically in groups of say six or eight. The blends are prepared in proportion to their estimated levels in the human diet based on their actual or predicted uses.

Feeding levels are some large multiple, e.g. 100 times, the human intake levels expressed on a body weight basis. A negative response to the administration of such dosage is taken to signify that each component of the blend reacts negatively. Thus in one test, data may be obtained on about a half-dozen compounds.

If the results indicate toxicity within the group, however, additional tests of the components either broken down into smaller groups, or individually, are necessary. Ninety-day studies such as these, now underway in our laboratories are yielding valuable data on flavor chemicals at minimum expense.

#### Some Flavor Manufacturers Already Undertaking Studies

In conclusion, it would appear reasonable to predict that not every chemical component of flavoring materials and other chemicals will necessarily have to run the gauntlet of a two-year toxicity study. With respect to those the safety of which is not generally recognized by qualified experts, or on the basis of their history of use, several possibili-

Tests of reproduction and lactation performance with white rats provide vital information concerning the effects of food additives

ties are open.

In vitro studies of enzymatic digestion (i.e., studies made in "test tubes" as contrasted to in vivio studies on animals) may reveal the ready conversion of some of these compounds to innocuous intermediate or end products; biochemical or intermediary metabolic investigations of relatively short duration may be employed with a similar objective.

However, with regard to chemicals or mixtures of unknown (but reproducible) composition for which metabolic studies are not applicable, it would seem unlikely that any escape will be possible from the

Turn to page 136

Have you ever been to a meeting that was dull and didn't seem worthwhile? Of course, you have! With proper planning and execution, meetings can be made interesting as well as profitable. Such a simple device as voice change, having a report given by three people instead of one, or moving participants into different kinds of activity may hold interest at a high level. Here are some suggestions on how to have -



Recent meeting of the Editorial Advisory Board of CHEMICAL PROCESSING magazine. Considerable planning is necessary to make such a meeting successful

# Better Meetings for Better Management

DICHARD W. WALLEN Creelman Associates, Cleveland, Ohio



RICHARD W. WALLEN is Senior Associate of Creelman Associates, management consulting firm. In his professional career, he has taught psychology in several universities and has had a number of papers published on psychology. Dr. Wallen is a past president of the Cleveland Psychological Association and a member of other organizations in this field. He received his AB at Findley College and his MA and PhD at Ohio State University.

The firm with which Dr. Wallen is presently connected, Creelman Associates, is an organization of management consultants specializing in the application of scientific methods to the decision-making process. One of its primary services is the development of special training programs for top and middle management. These programs aim to increase executive ability in leading problem-solving groups and committees. Advanced psychological methods used in the training also improve communication and understanding among the management team.

Creelman Associates also offers consultation in the area of Operations Research and in the development of research policy and research departments. The firm was founded in 1954 by George D. Creelman, a chemical engineer.

If management meetings are to check results worth holding at all, they are worth the additional effort it takes to make them interesting and effective. Planning good meetings is not an easy task but it becomes easier with practice. Experience has shown that an analysis of the objectives of a meeting and selection of the proper steps to achieve these objectives will eliminate dull meetings that do not accomplish their purposes.

Too many meetings in too many chemical processing firms are too boring and too wastful of the participants' time. No wonder there are frequent cries for cutting down on meetings! What is needed are more meetings that are effective and interesting, not just fewer meetings.

Effective meetings require careful planning, creative thought, and attention to the psychology of the audience. Planning can be divided into five steps:

1-Defining objectives of the

2-Choosing suitable methods for reaching objectives

3-Predicting response of participants to meeting

4-Modifying original plans 5-Evaluation and feedback

#### 1-Defining Objectives of Meeting

A company executive has certain objectives in mind for a meeting or he wouldn't want to hold it. Quite often, however, he doesn't define these objectives precisely enough. Maybe he wants to communicate certain information and develop cross-talk among participants. Perhaps he wants to integrate operations of different departments. It is important to define these objectives before proceeding further with meeting plans.

Meetings may have one or more of the following kinds of objectives:

a-To transmit information b-To identify problems

c-To solve problems d-To produce interaction among people

e-To motivate or stimulate f-To change attitudes

g-To develop or improve skills

These individual goals require different kinds of meetings. Sometimes too many goals are set for one meeting. Using appropriate methods for each one would result in an unwieldy and lengthy session. In this case, priorities can be set up and a series of meetings held, each devoted to a different objective. On the other hand, different objectives sometimes can easily be combined.

#### 2-Choosing Suitable Methods

After the goals of a meeting have been carefully determined, ideas about the actual form of the program begin to take shape. If we want to transmit information, for example, we often resort to a lecture. When this method is selected, we ought to be sure we have an effective speaker; and we should find out whether he can use a blackboard. slides, or large posters.

Sometimes, however, it is better to transmit information by duplicating the lecture or report and distributing it to participants in advance of the meeting. Then the speaker can abbreviate his talk and stress highlights that participants need to know. Another method is to present a brief lecture and leave details for the question period. Details may also be placed in full reports to be handed out at the end of the meeting.

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An interesting shift in the usual procedure is to break the audience into small groups of six or seven people. The groups are given half an hour to agree on three or four questions they would like to ask about the general topic of the meeting. These questions are collected and given to the speaker to study while the audience takes a fifteen-minute break. When the total group reassembles, the speaker presents a talk organized around the questions.

Several advantages are gained by using audience subgroups. In the first place, questions are frank because the originator remains anonymous. Second, the questions are likely to be more pertinent and better-phrased than when asked by individuals. The sub-group acts as editor. Third, more people talk because it is harder to be quiet in a small group than in a large one. Furthermore, reticent people are more willing to express themselves before a small, informal group.

In using sub-groups, however, be sure that the question or task assigned is clear to everyone. Some pretty bad meetings have resulted from giving vague or confusing instructions to the audience.

When the purpose of the meeting is to identify or to solve problems, a speech is not very useful. Usually the chairman states the problem briefly and puts the groups to work. For example, the chairman may say, "We, in the research department, have been trying to develop ideas that we think will be useful to the company. We often feel, however, that we do not have a good way of getting ideas from other parts of the organization. I would like to have each one of the small groups list three or four things that make it difficult for other parts of the organization to communicate with research."

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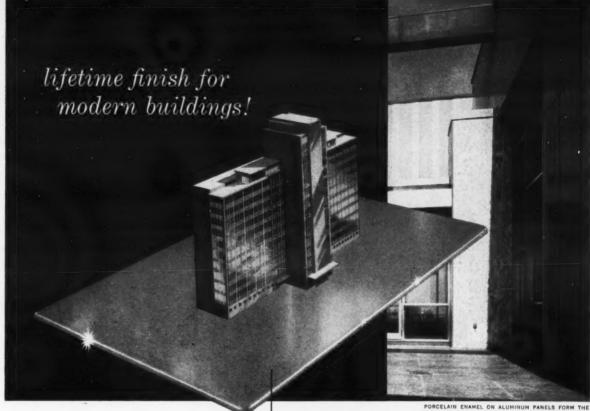
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Each group has a reporter to present the conclusions to the audience, and they are recorded on large blackboards so that all may see them. The chairman may then ask for a general discussion in order to

Tuen to page 137



PORCELAIN ENAMEL ON ALUMINUM PANELS FORM THE INTERIOR WALLS OF THIS PATIO AREA ON THE ROOF OF THE ALCOA BUILDING, PITTSBURGH, PA.

# Trona helps make Lithium ARCHITECT

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The lifetime finish of porcelain enamel makes it a versatile modern architectural material. Used as a tough, ceramic coating for architectural aluminum, porcelain enamel enables architects and engineers to take full advantage of the lightweight metal for dramatic structural and decorative purposes. It enhances color appeal, durability and ease of fabrication.

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Check 1072 opposite last page.



". . . Atomic ashes of power and production reactors should NOT be called waste. This is a misnomer . . ."

Although still in its infancy, industrial use of radioisotopes and radiation is growing rapidly. Tremendous savings are already being realized through their use. What about tomorrow? Here is what the Commissioner of the AEC has to say about . . .

# ISOTOPES AND OUR ATOMIC FUTURE

DR. WILLARD F. LIBBY

Commissioner

United States Atomic Energy Commission

Today our country is benefiting enormously from the uses of isotopes. Present savings in industry and agriculture amount to about \$500 million per year — excluding medical and research benefits. Cost to the government for all this is something like \$3 million per year. Obviously, if such enormous savings have been effected already with the small amounts of isotopes that are now used, the potentiality for savings is very much greater.

I estimate that by 1960 these savings will reach \$5 billion per year at an annual cost to the government not in excess of \$20 million. By that time isotopes will probably be paying the whole way for the atom, and the American people and the Western World will get their atomic armament and their nuclear power development costs all free - in the sense that the benefits of the \$5 billion savings in industrial processing and agricultural costs are pretty well distributed among the taxpayers so that the AEC budget can be offset against these savings in a fair and equitable way.

Where are we going to get the additional \$4.5 billion annual savings? Some of it will undoubtedly come from the expansion of known applications of radioisotope techniques. The great bulk of it, however, will come from new applications.

# Chemical Industry Possibilities

Take the chemical field for example. The organic chemical industry, including the oil business, does not at the present time make any important use of either radioactive carbon or radioactive hydrogen, the two most important elements with which they work in their normal manufacturing operations.

It seems feasible that safe lowlevel labeling of processing materials could provide a means of controlling production operations in the plant.

We also hope that the chemical industry will pursue the possibilities of using atomic radiation for the promotion of chemical reactions. In this connection we see what may develop into an important combination — chemical manufacturing and atomic power. Who knows but that these radiation-induced reactions may not prove to be really economic? It might pay for chemical companies to get into fuel reprocessing if only to make use of the by-product radiation.

Another important potential

development in the use of isotopes is in radioactive drugs and medicinals. In many instances these substances must be grown rather than synthesized in the laboratory. Some six or seven years ago an Isotope Farm was established at Argonne National Laboratory near Chicago with the purpose of supplying the raw materials needed for these applications. As a result, we now have a national treasure in a barnful

**Rock-bottom Prices of Isotopes** 

Isotope	Half-life	Rock-bottom Cost (per curie)	Present Selling Price (Dollars per curie)
Cobalt-60	5.27 years	6 cents	9
Tritium	12.46 years	25 cents	2
Carbon-14	5568 years	110 dollars	22,000
Sulfur-35	87.1 days	0.5 cents	2000
ledine-131	8.08 days	0.04 cents	550
Cesium-137	33 years	30 cents	10

(Above figures are based on \$7 per milligram of neutrons of which \$4 is production of material and \$3 is for chemical separation of the isotopes.)

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WILLARD F. LIBBY has been a member of the US Atomic Energy Commission since October 1, 1954. During World War II he was with the Manhattan District Project at Columbia University, on leave from the University of California where he taught chemistry for eight years.

In 1945, he became Professor of Chemistry, Institute for Nuclear Studies, University of Chicago, where he became well-known for work on natural carbon-14 and natural tritium. Dr. Libby received his BS (1931) and PhD (1933) from the University of California. He is also recipient of ScD, Wesleyan University, 1955; University of Dublin, 1957 (honoris causa).

of radioactive plants of many different types, all stored and ready for chemical extraction and separation needed to produce the desired medicinals and chemicals.

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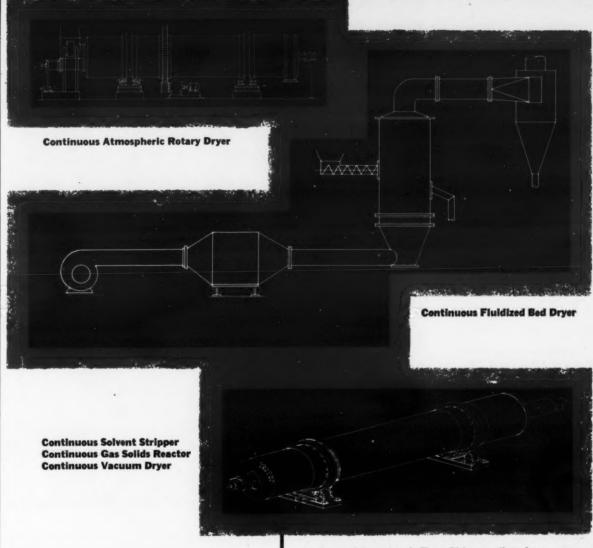
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Price

The plant products from the Isotope Farm have been used in many ways. It has been possible to detect and isolate natural products from them which occur in concentrations which are beyond the limit of detection with the use of ordinary chemical assay methods. Among the more important of the labeled compounds isolated have been digitoxin, morphine, nicotine, amino acids, proteins, and vitamins, as well, of course, as the materials in great abundance. In the case of many of these compounds, this is the only way in which they can be obtained at the present time in radioactive form for use in tracer research or diagnostic applications, their synthesis being beyond the skill of the organic chemist.

Turn to next page



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Check 1073 opposite last page.

#### **Our Atomic Future**

Starts on page 52

Isotope Production, Disposal

The economic feasibility of private enterprise participation in radioisotope production appears imminent. Actual undertakings by private industry in this area primarily are dependent upon sufficient further development of the radioisotope market to support private radioisotope production reactors. One company has already announced its intention to construct a reactor for the production of process steam and for radioactive cobalt-60 at the rate of 1 million curies per year. This will be the first privately-owned reactor for large scale production of radioisotopes.

Isotopes can be produced in several ways. The action of fission itself produces radioactive atoms in major quantities, there being about 150 different fission products of various characteristics. Therefore, from the atomic ashes of power and production reactors, we can obtain isotopes by chemical or physical separation.

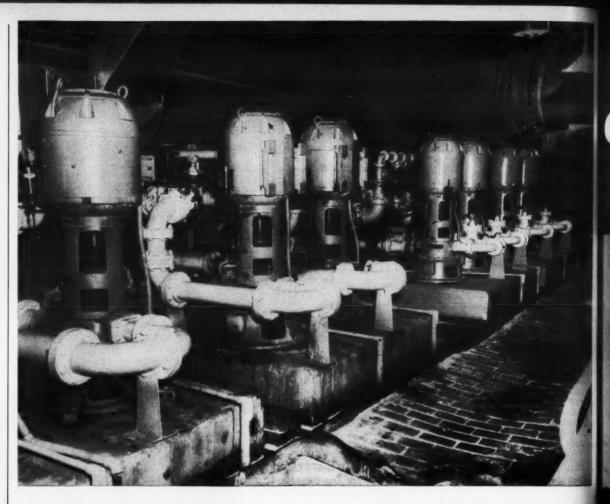
There is a need to emphasize this fact clearly because a common misconception of the value of these materials exists, the task of dealing with their disposal in the sea and even in interplanetary space is frequently put as a major one for atomic development.

I believe this is unlikely to be the situation and that the value of the fission products as isotopes will be such that, except for the most dilute and intransigent solutions, valuable use will be made of them. They should **not** be called "waste." This is a misnomer.

#### Isotopes - How Much?

We have to consider the cost question from several points of view, but let us try to estimate minimum, or rock bottom, costs one could expect under the largest volume uses in order to eliminate quickly applications of isotopes which might be really too expensive under any conditions. In order

Turn to page 267



# "Plant Down Time Was Materially Reduced"

During the first three years of operation, before the LaBour pumps were installed, this contact acid plant experienced frequent shut-downs. Because the pumps are under suction lift, handling up to 98% sulphuric at temperatures up to 85°C., it was considered normal when pump packing lasted a week and there were many times when repacking became necessary in a matter of hours.

In 1946 they replaced with LaBour Type G pumps, which are packingless, and their troubles were over. Four years later when they doubled the capacity of the plant they bought more LaBours. The original LaBours are still on the job, each pumping 150 gallons per minute around the clock.

You can profit from this experience. When your process depends upon the operating continuity of a pump, you need a LaBour—and when you need a LaBour, nothing else will do. Write for full information.





Check 1074 opposite last page.

# chemical business



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Team Management At Amoco
"... guided by definite principles"... page 57



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# Highlights

Amoco Chemicals, formed early this year from three Standard of Indiana subsidiaries, planning major drive for chemical industry markets

page 57

National Distillers, Mallory-Sharon form integral titanium, zirconium producing group

page 59

US Army accepts 100 percent butyl rubber truck tires.
Thus butyl moves in on "synthetic-natural" rubbers for heavy-duty tire market page 60

High-pressure polyethylem producers ignore the "experts," plan huge expansions in intermediate-density resins

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Amoco's O'Connell: "Our objective is simple
... a strong position in the industry"



"We're now able to act like a chemical company"



"The bulk of our sales in ten years will probably be stuff we don't even make today"

From a loosely associated collection of production units, management groups, and sales organizations has emerged a strong competitor in the chemical field — Amoco Chemicals. Here, in an exclusive interview with Chemical Business, the company's management defines . . .

# Amoco Chemicals — Today and Tomorrow

The redecoration in progress in the lobbies at Standard of Indiana's Chicago Lakefront office building seems to fit very well the atmosphere around Standard's new chemical subsidiary, Amoco Chemicals—still rather in a state of flux and not quite defined, but guided by a group of men who seem to know exactly where they are going.

"Our objective is simple", says marketing v-p John O'Connell: "To gain a strong position in the chemical industry." And although this may sound easier than it actually is, Amoco seems to be well on the way to doing just that. Formed early in the year from three Standard subsidiaries — Pan American Chemicals, Indoil, and Hidalgo — the whole of Amoco is already seeming to be greater than the sum of its parts.

The company's birth came as part of a general reorganization of Standard's subsidiaries. "The purpose of the reorganization," explained President Jay For-

**rester,** former Indoil president, "was to form new organizations built along more functional lines.

"The whole shift involved nine principal subsidiaries — actually there were a great number of units involved — which were consolidated into major functional companies. These include Pan American Petroleum, responsible for all oil and gas production, the American Oil Company, handling Eastern and Southern refining and marketing, and Service Pipe Line Com-

pany, handling all crude pipeline transportation. Amoco, of course, is the new company responsible for all chemical manufacturing, marketing, development, and research.

"Previously, the Amoco Chemical components were essentially marketing companies. Most of the production units were behind refinery fences and were operated by refinery personnel. New product lines were dictated by raw materials at hand and were fitted to

Turn to next page

# Where dependability is at a premium....



FW Vaporizer at AUTOMATED **Gasoline Plant** gives trouble-free operation in virtually unattended service

At the Ropes Field Plant, operated by Honolulu Oil Corp., slightly less than 2000 MCF of gas per day were available for processing - hence capital expenditure and operating costs for this isolated gasoline plant had to be kept to an absolute minimum. Process heating is provided by a FW vaporizer using Para-Cymene which operates at only 380 F, 8 psig! Designed for maximum automation and a minimum operating force, the Ropes installation has fully lived up to the owners' expectations for dependability and economy of operation.

# high-temperature, low-pressure units HEAT-ENGINEERED by FW prevent outages - cut maintenance

Over a period of 23 years, Foster Wheeler engineers have recognized that an entire process system should be analyzed before recommending the proper high-temperature, low-pressure vaporizer. This application engineering "beyond the vapor outlet" assures a vaporizer that's right for the job - perfectly matched to a heating system with the most efficient and dependable piping arrangements, circulation method and thermal design.

Another advantage is that only Foster Wheeler does the complete job - designs and builds the vaporizer, installs it in your plant, puts it "on stream", and follows through with checkups and service to assure continued top performance under changing conditions of operation. For further information, send for Bulletin ID-54-5. Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.

# FOSTER W WHEELER

LONDON . PARIS . ST. CATHARINES, ONT.

Check 1076 opposite last page.

#### Amoco

Starts on preceding page

the needs of the parent company rather than to specific markets to be exploited.

With the new set-up this is no longer the case. We now have a complete chemical structure - manufacturing, marketing, development, financial, and management functions. We're free to pursue whatever markets present themselves so long as they fit into our pattern — an organization making best use of the facilities of both our parent and ourselves. In short, we're now able to act like a chemical company."

How does a chemical company act, particularly a new chemical company?

One of the best indications of how Amoco is going to act is the fact that within three months after it came into existence, two separate new plants were announced The first, a hydrocarbon oxydation unit going up near Joliet, Illinois, actually grew out of some research being carried on by Standard of Indiana and Scientific Design before the merger. The plant is expected to produce about 60 million pounds annually of phthalic anhydride, isophthalic add terephthalic acid, dimethyl terephthalate, dimethyl isophthalate, and benzoic acid While plant cost is undisclosed, the unit, to be completed in July of next year, will employ about 160 people and have a payroll in the neighborhood of \$1 million annually.

The second of Amoco's new entities is an operation at Seymour, Indiana, to produce a new, smokeless starter cartridge for jet engines. The plant is expected to be on stream about No vember 1. Amoco can't say what the capacity of the plant is but the Air Force contract calls for almost \$3.5 worth of business.

This is Amoco today what will it be next year or ten years from now?

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### National Distillers, Mallory-Sharon Form Strong Competitor In The Titanium, Zirconium Field

Formation of a fully integrated titanium and zirconium producer has been announced by its parent companies, National Distillers, P. R. Mallory, and Sharon Steel. Formation of the new company is, in effect, a merger of National Distillers' titanium and zirconium sponge producing operations and Mallory-Sharon Titanium, sponge melters.

The new company will also include Reactive Metals Inc., now jointly owned by National and Mallory-Sharon.

National has a plant under construction at Ashtabula, Ohio, with design capacity of 10 million pounds of titanium

and 20 million pounds of zirconium annually. The zirconium operation was slated to go on stream at presstime while the titanium facilities will be operating by the end of the year.

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Mallory-Sharon is the second largest US producer of titanium mill products and is currently capable of melting a million pounds of titanium monthly at its Niles, Ohio, plant. Up to now, the company has bought its sponge on the open market.

### Milestone for Titanium

The titanium industry has received the largest industrial order for fabricated titanium in its history — seven miles of seamless pressure tubing for chemical process application.

The tubing, to be extruded in 2130 sections, will be used in eight kettle-type

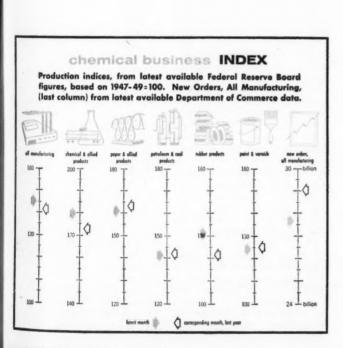
heat exchangers employed in processing nickel and cobalt ore at Freeport Sulphur's plant to be built at Moa Bay on the northeast coast of Cuba.

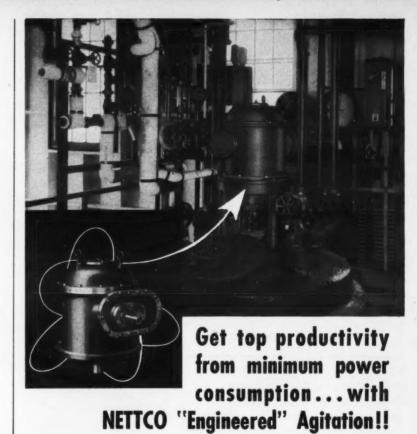
The Moa Bay plant is part of a \$110 million Freeport project aimed to alleviate the chronic shortage of nickel. From mining and treating facilities at Moa, a nickel-cobalt concentrate will be shipped to Braithwaite, La., for final separation of the nickel and cobalt as metals.

Planned annual capacity is 50 million pounds of nickel and 4.4 million pounds of cobalt.

The tubing is being furnished by Titanium Metals Corporation.

Owned jointly by Allegheny Ludlum and National Lead, the company produces sponge and ingot at its Henderson, Nevada, plant.





The agitator should suit the application . . . or unsatisfactory agitation, high power costs, and excessive maintenance may result. Exact process specifications can be met by providing the right combination of motor, drive, shaft, and stirrer. Nettco's ability to provide these standardized components . . . in the right size, the right speed, the right horsepower, etc. . . mean savings and dependable, uninterrupted service to you. Check the design features of the Model T agitator line, and see what over fifty years experience . . . in producing the most complete agitator line avail-

able . . . offers you.

 Minimum moving parts in compact, fully enclosed housing

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- Large diameter "stepped" vertical shaft
  Widely spaced, oversized Timken bearings

Model WT units, featuring worm gear reduction drives, offer ratios from 3.5:1 to 68:1 — plus many modifications to suit application needs. Send your process specifications to NETTCO agitation engineers for recommendations . . . Request Bulletin 551 and data sheet from New England Tank & Tower Co., 93 Tileston St., Everett 49, Mass.





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Check 1077 opposite last page.

# ATLAS

CHEMICALS DIVISION
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# FOR COSMETIC CHEMISTS Bulletins on Anti-perspirant Sticks, Silicone Creams, Methods of Using Glycerol Monostearate

To speed cosmetic formulation work and cut lab costs, Atlas has issued three new bulletins for cosmetic chemists: (1) How to make cologne-type anti-perspirant sticks; (2) formulation of soap-free protective creams and lotions based on silicones; (3) New methods for using non self-emulsifying glycerol monostearates. Check coupon below.



#### FOR REFINERY CORROSION ENGINEERS Aquaness Desalting Compounds and Corrosion Inhibitors

Modern chemical methods for protecting refinery and gasoline plant equipment from corrosion are making important savings in maintenance and original equipment costs. This new booklet describes how Aquaness chemicals are used for removing salt from crude oil and for corrosion inhibition in refineries. For a copy, check the coupon below.



# FOR COMPOUNDERS OF CLEANERS RENEX® 600 Series Detergents

Available from Atlas, for use in various types of formulas for industrial and domestic cleaning compounds, is a new line of nonyl phenol detergents. The Renex "600" series covers a wide range of viscosities, cloud points, HLB value, wetting and foaming properties. All are listed in recent Product Information Bulletin.



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Check 1078 opposite last page.

chemical business

# Marketing



Butyl-tire-equipped Army truck bounces over the "world's worst road" during tests

# Butyl Joins Coral, Ameripol SN In Bid For Rubber Market

Probably the most significant recent news in the rubber industry is the announcement by the Army that it has accepted an all-synthetic truck tire for general service use.

Built of 100-percent butyl, the tires offer two major advantages over those currently used: First of all, rather large savings will accrue from the fact that the tires withstand oxidation. Consequently, they won't deteriorate as quickly

as the natural rubber tires. Under some conditions natural rubber tires will degrade in as little as 60 to 90 days.

The second — and most important — advantage is the fact that the new tires will make the United States independent of foreign natural rubber sources in case of another conflict.

This now puts butyl in direct competition with Firestone's Coral and Goodrich-Gulf's Ameripol SN rubbers, both developed to perform jobs that previously were completely in the domain of natural rubber. Both Coral and Ameripol SN are so-called "synthetic natural" rubbers, having the same molecular structure as the natural material.

Butyl holds a clear advantage over the two other contenders in that it is in full commercial production. Neither the Firestone nor the Goodrich-Gulf material is produced in commercial quantities, although Fire-

stone has also recently announced development of a truck tire built entirely out of its Coral rubber.

Although the common synthetics have performed well in normal automobile service as well as in a myriad other applications, they haven't made a good showing in heavyduty time service. The principal reason is the amount of heat generated. The synthetics generally have somewhat less "flex" than natural rubber, consequently have more "road drag" and run hotter.

Esso Research and Pennsylvania Tire Company, developers of the butyl tires, solved the problem of resiliency by additives and modifying agents. Higher resiliency is an inherent quality in both the Coral and the SN rubbers.

One of the most important aspects of the new butyl tires is that they can be fabricated on conventional tire-

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making equipment. This is made possible by the development of a butyl latex dip. The latex permits bonding of the rubber to the tire cord.

The Army's acceptance of the butyl tire (9.00x20) has prompted work on even larger equipment which is, for the most part, now using natural rubber. Currently under development are tires in the 14.00x20 and 24.00x25 earthmover types.

### Gallup Measures Reaction To Terms

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What do the terms "vinyl," "acrylic," and "alkyd" mean to the public when used in merchandising programs? Dewey and Almy, a division of W. R. Grace, recently asked Audience Reseach, Inc. — the Gallup Poll — to find out how many people recognized the terms and what they meant to them.

The point of the study was to find out whether the word "vinyl" would be an asset when used in sales messages concerning vinyl points. "Acrylic," "alkyd," and "latex" were included for control.

The Results:

A majority (61 percent) of adults — the study included 1625 adults in 155 areas — recognized the word "vinyl" and 53 percent can name at least one product made from it. Somewhat fewer — 37 percent — can recall such vinyl properties as durability, ease of cleaning, and flexibility.

Not nearly so many—
18 percent each—say they have heard of acrylic or alkyd, and less than half of these are able to mention products or properties.

Latex, a broad term used to describe a wide range of water-thinned paints, including vinyls and acrylics, drew 70 percent recognition and strong association with rubber products.

More complete data concerning the study are available from CHEMICAL BUSI-NESS. For a copy check

1079 opposite last page.

From underground to roof top... this is the house that Velsicol made more economically and with quality!



These are just a few of the products of Velsicol's continuous research to make better products cost less for the good of all.

Write for our latest technical bulletins on any of the items listed or indicate your particular field of interest and we will be happy to send you, without cost or obligation, the technical data we have available.

# VELSICOL CHEMICAL CORPORATION

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#### LOOK FOR THIS MAN

Your Velsicol representative
... a qualified chemist who
will help you make better
products for less!

Check 1080 opposite last page.



# **Adhesive Manufacturing Problems?** Call COLTON for the right raw materials

It will pay you to check these Colton resins and their uses:

Colton Vinol POLYVINYL ALCOHOL for ADHESIVES and COATINGS.

Colton Vinac and Flexbond POLYVINYL ACETATE EMUL-SIONS for ADHESIVES and COATINGS.

Colton Vinac POLYVINYL ACETATE BEADS (Acetate in Solid Form) for ADHESIVES, COATINGS, SATURANTS, HOT MELTS and HEAT SEALS.

Colton Chemical Company-pioneering and long-established source of polymer resins—is recognized by adhesive manufacturers as the basic supplier of the right raw materials.

You get the best in service and the most out of your products in quality, sales and profits when you come to Colton.

Call on Colton representatives now for samples and recommendations. Address Dept. A33.

Also consult Colton if you have problems in chemicals involving Textiles, Paints, Leather, Paper and Inks.



A Division of Air Reduction Company, Inc. • 1747 Chester Avenue • Cleveland 14, Ohio Sales Offices and Warehouse Facilities Throughout U. S. . Export: Airco Company International, New York 17, N. Y.

Check 1081 opposite last page.

# chemical

# business Our Growing Industry



Expanded low molecular weight polyethylene facilities at Buffalo, New York, plant of Allied

# More High-Pressure Polyethylene In Face Of Low-Pressure Rush

More high-pressure polyethylene capacity is on the way. National Petro-Chemicals has announced plans for a second unit, this one to produce an annual 75 million pounds of material. The new plant will boost National Pet's polyethylene capacity to 175 million pounds.

The operation will produce intermediate-density materi-

Site of the plant has not been decided on although it definitely will not be constructed at Tuscola, Illinois, location of the present polyethylene facilities. Several Gulf Coast

states have been under consideration and the company has obtained options on more than one location.

With its current 100 million pound capacity, National Pet is the third largest polyethylene producer in the US.

This is the latest of a number of recent announcements of increasing highpressure polyethylene production. Although experts predicted just a couple of years ago that the low-pressure processes would account for all of the future polyethylene capacity, Spencer, DuPont, Allied, and now National Pet have announced high-pressure expansions in recent months.

For the last year DuPont has been in the process of doubling its capacity of the material. The completed capacity should be on stream

sometime in 1958 and is expected to total something in the neighborhood of 200 million pounds.

Spencer is also in the process of doubling its a pacity. Expansion of the company's Orange, Texas, plant will boost capacity to 90 million pounds. The additional capacity will also be in intermediate density ma-

And although it has little effect on the conventional polyethylene market, Allied has also announced expansion of its low molecular weight polyethylene. Specilically, the expansion is in its capacity for emulsifiable resins, used primarily for such applications as waxes, polishes, textile finishes. paper coatings, and in building materials.

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Plans to construct a 400 ton per day sulfuric acid regeneration plant to process oil refinery sludge acids have been announced by Stauffer Chemical. The plant is already under construction and will be completed and on stream by the middle of next year.

Cost of the unit will be in excess of \$4 million.

### Spencer Schedules 2nd Urea Operation

Spencer Chemical has released plans to construct a new urea plant at its Henderson, Ky., works to produce 100 tons of material daily. Plans call for completion in the summer of 1958.

The company now has a urea unit in operation at its Vicksburg, Miss., works.

The new facility will convert a portion of the ammonia produced at the Henderson Works to the ureatype solutions already produced at Vicksburg and will also produce prilled solid urea, an addition to the company's product line.

#### This Month In Chemical Processing

Thinking of selling or producing in South America? Then you'll be thinking of doing some market research on South American markets.

This month, Roger Williams, president of Roger Williams Technical and Economic Services, tells what you'll run up against when doing business with the Latins and how to get the most from your research efforts. Turn to page 38.

The Fuel outlook tomorrow—what is the status of the world's petroleum reserves? One of the top authorities, Dr. Lewis G. Weeks, chief geologist for New Jersey Standard, appraises our store of oil reserves. Read how Weeks evaluates supplies of one of our most important raw materials starting on page 28.



# "Auto-mersion" freezing may go to sea

Glycerine in immersion freezing processes can provide important advantages for fast automatic freezing. Adapted to commerical fishing vessels, such "automersion" may well enable the fisherman to preserve fish within minutes of the time of catch.

The ideal refrigerant liquid in such a process is one based on Glycerine—with its unique combination of low freezing point and nontoxic properties in solution. The unwrapped products can pass directly through the refrigerant, will emerge separately frozen, will not fuse into a solid mass. Salt or other acceptable additives may give extra preserving power to the freeze solution.

Glycerine has already been applied in solutions for freezing by direct contact, experimentally here—commercially abroad. In other types of food applications its acceptability has long been a matter of record.

Glycerine's usefulness continues to grow. Stable in price, dependable in supply, Glycerine offers processors a unique balance of properties: it is hygroscopic, nontoxic, stable, nonvolatile, with excellent solvent power and agreeable taste. New applications for Glycerine are extending its use in foods, pharmaceuticals, coatings, packaging and many other fields. For a useful 20-page booklet, "Glycerine Properties and Uses", write to:

# Glycerine Producers' Association

295 Madison Avenue, New York 17, N. Y.

Nothing takes the place of Glycerine

Check 1082 opposite last page.



# the completely new Filteraid for use in strongly alkaline liquors-

The idea of using carbonaceous filteraids in processes involving caustics or fluorides is not new. But NEROFIL - a processed carbon-based filteraid - is completely new...and valuable because it overcomes the difficulties often encountered with earlier carbon materials.

(A) is a photomicrograph of a crushed carbonaceous material (quite similar to previous carbon filteraids). This, however, is merely the reactor feed from which NEROFIL (B) is made. Both photomicrographs are the same magnification. The marked differences are evident.

NEROFIL's success as a filteraid stems from two important features. First, of course, its physical and chemical stability...even boiling caustic has negligible effect. Second, the high filter cake porosity and low cake density of NEROFIL yield fast throughput of liquid and superior clarity of filtrate.

This stability and filtration efficiency have led several different industries to adopt NEROFIL in their processing, with excellent results. Complete information on NEROFIL is available to you in a new bulletin, just issued ... write for it.

### Great Lakes Carbon Corporation

Nerofil Department - 612 So. Flower St., Los Angeles 17, Calif. Dept. LTK - 333 No. Michigan Ave., Chicago 1, Ill.

Check 1083 opposite last page.

#### Amoco

Continued from page 58

"The bulk of our sales in ten years will probably be of products we don't even make today," O'Connell predicts. "We, of course, can't reveal what direction the future growth will take but it will be guided by definite principles. First of all, all growth and future activity of Amoco will dovetail with the present activities of the company and of the parent. And this doesn't necessarily limit us to petrochemicals. even organics. The criterion for any future operation is still only that it fits into our pattern.

Another indication of Amoco's planning is the growth in the Development and Marketing departments. "Since formation of the company," explained Development Manager George Harrington, "these staffs have already doubled, and are expected to re-double within the next few months. As a matter of fact, one of our prime problems right now is to find enough capable men to fill these spots.

And we can draw on the full research facilities of Standard. Indiana has a staff of over 1300 research people at Whiting (Standard's Indiana refinery). This puts us in an excellent research position and will help us pursue whatever projects seem advisable."

How big really is Amoco? Although Standard isn't prone to release annual sales figures on its subsidiaries, some hint can be found in the fact that Standard of Indiana's sales of chemical products in 1956 (before the merger) amounted to \$17.5 million, a 21 percent increase over 1955. (Presumably these figures represent the bulk of the business of the various groups which now comprise Amoco). And while direct questions about current sales are met with stony silence, indications are that the 1957 sales of the company will be appreciably higher than those of the components quoted above for last year.

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# Spotlight on people

Replacing Neil McElroy who takes over as Secretary of Defense the first of this month, Howard J. Morgens is appointed president of Proctor & Gamble. Morgens was previously P & G executive v-p.

L Edward Klein and Dr. David T. Mowry are appointed assistant directors in the development department of Monsanto's organic chemicals division.

C. E. Ford is named new products marketing manager for



National Carbon, division of Union Carbide. New chemical products marketing manager for division is William W. Palmquist. More news from Union Carbide . . . George E. Drake is appointed vice president in charge of sales for Electro Metallurgical division and Charles H. Atwood becomes president of Union Carbide Caribe, Inc., Puerto Rican subsidiary of

Kenneth C. Towe is elected to newly created post of chairman of the board and Dr. Wilbur G. Malcolm becomes president and chief executive officer at American Cyanamid. H. W. Bajak is new general sales manager for Cyanamid's fine chemicals division.

Thomas M. O'Neil Jr., formerly sales and marketing v-p for Heyden Chemical, is the new general manager of sales for Petroleum Chemicals, Inc., equally owned subsidiary of Cities Service and Continental Oil.

At Amoco Chemicals, R. L. Hockley, a consultant in the chemical industry, is elected to the Board.

American Enka Corporation elects two new v-p's: C. Chester Bassett Jr., vice president for sales and Dr. Frits Prakke. vice president for manufacturing.

Continental Oil promotes three to newly created positions in petrochemical department: J. G. Hough becomes assistant general manager, Paul E. Geiser is made manager of department's detergents di-



vision, and W. B. Strobel is new manager of department's chemicals division.

Newly appointed director — product and process licensing for B. F. Goodrich Chemical is Robert P.



With Pittsburgh Coke & Chemical's promotion of two executives to head up activities of protective coatings division, Norman T. Shideler is elected president of Insul-Mastic, Inc., newly acquired subsidiary producing for division, while Arthur E. Gray is named to succeed Shideler as division's general manager.

Joseph P. Flannery is appointed sales manager for National Polychemicals, Inc.



Cementable TEFLON, Garlock No.

8536, with one side treated and ready for application to any metal, wood, glass, concrete, plastics or other surface, with standard commercial adhesives, is now available in economical thin-section (.005" to .060") continuous tapes up to 12" wide, and in 1/16" and thicker sheets up to 48" x 48"

\*du Pont Trademark

For further information, write for Bulletin AD-158.

> **United States Gasket Company** Camden 1, New Jersey

United **S** tates

Gasket Plastics Division

OF THE GARLOCK PACKING COMPANY

Check 1084 opposite last page.

At A. E. Staley Mfg. Co., a different concept in starch drying equipment . . .

# speeds starch processing and improves quality

Problem: For many years, drying starch processed from corn has been a slow and wasteful operation. Here is an example of how it was done at A. E. Staley Mfg. Co., Decatur, Ill.

Starch cake, separated from slurry on leaf filters, was manually dumped and placed in trays. Trays were placed on steel frames equipped with wheels running on tracks. Each car held about 1500 lb wet (50% moisture) cake. When it was full, car was pushed into drying tunnel or kiln. It took 20 to 24 hours for a car to progress through kiln.

Cars removed from dry end of kilns were transferred to dumping pit where each tray was manually removed and dumped.

Throughout the years, various mechanical gadgets were devised and built, mostly in company's shops, to eliminate hardest manual operations. Still the process left no room for expansion to take care of increasing demands. Flexibility was nil. Product was not dried uniformly. There was loss from trays and the many manual handling operations involved. Chances for product contamination were many.

Meanwhile, increased demands for modified starch products having tighter specifications could not be met in the plant (Chemical Processing, August 1957, p. 46). Capacity and quality were not possible.

Solution: Staley planned and constructed a new starch dryer building, using a new concept in starch drying equipment.

In the new installation, starch slurry from receiving tanks is transferred through shakers to remove any foreign material. The shakers are equipped with nylon screens (approximately 140-mesh) which sift and size solids in the slurry. Vibrating action of shaker to agitate series of balls over entire screening surface keeps screens clean for fast, free passage of through material. Special facilities are provided for easy removal and replacement of shaker frames.

Slurry then moves by gravity from shakers to vacuum drum filter with-flapper and string discharge. Filter is 8' in diameter, 10' long, and is equipped with rubber-grid drainage decks, special filter valve and stainless steel drums and tanks. Filter valve's design completely eliminates pressure drop across the valve and in so doing increases filtrate and air flow approximately 25%. Two water sprays on each filter are designed to obtain optimum washing of filter cake . . . 95% of filtrate in the



Wet starch cake falls directly from vacuum drum filter onto moving perforated stainless steel apron carrying material through dryer

cake is replaced by clean wash water.

Finely dispersed starch remaining in the filtrate and wash water is separated in cyclone clarifiers. These recover the starch as a concentrated suspension which is returned to slurry ahead of filter. Water from clarifiers, suitable for re-use, is sent back to processing plant.

Discharge from filters is fed directly into continuous apron dryers, in which propeller fans

recirculate preheated and filtered air uniformly through the wet cake. Part of the air is recirculated through brass steam pipes and mixed with fresh air for reuse. Close control is maintained on air's humidity and temperature. Six exhaust fans with total capacity of 40,000 cfm remove moisture-laden air from each dryer.

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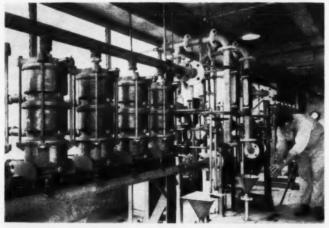
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ОСТО

Steam pipes in heat-exchange bank are constructed of brass to reduce starch contamination. Bank is placed beside belt so that accumulated starch on pipes will not fall back onto belt. Also, high air velocity in dryer helps to prevent starch buildup on pipes.

Dryers are of aluminum and stainless steel construction and are equipped with belts 85' long and 10' wide, traveling at 1.7—2.1 fpm. Woven wire belts that would normally carry the starch through the dryers have been replaced with perforated stainless steel aprons, welded to box girts. This results in a stiffer belt and overcomes sagging that might cause uneven distribution of starch and resultant non-uniform drying.

There are four separate filtering and drying units to handle different starches, thus eliminating possibility of contamination from other starches. All opera-



Finely dispersed starch in filtrate and wash water is separated into a concentrated slurry in these cyclone clarifiers. Slurry is then returned to filter

66

tions are controlled from centrally located control panels. Results: Filtering and drying operations are much improved over older methods:

 Drying efficiency has been increased — about onethird less steam is used per pound of starch.

 Drying time reduced — it takes about 40 minutes to dry a larger amount than could be dried in one car in 20 hours.

Uniformly dried material is obtained.

 Chances for product contamination have been greatly reduced.

Where older method is essentially a batch operation, newer is continuous and automatically controlled — there are hardly any manual operations in the new plant.

Now Staley is able to turn out these high-quality speciality starches, which were



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Series of balls keep nylon screens clean to assure fast throughput of starch slurry in shakers

not possible in the kilns. Low ash content and color requirements have been met. These special starches have become some of Staley's largest tonnage items.

(Roball shakers are manufactured by J. H. Day Co., Div. of Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.)

Check 1085 opposite last page.

(Vacuum drum filters are manufactured by Eimco Corp., 634-666 S. Fourth West St., Salt Lake City 10, Utah)

Check 1086 opposite last page.

(Cyclone clarifiers are manufactured by Dorr-Oliver Inc., Barry Place, Stamford, Conn.)
Check 1087 opposite last page.

(Continuous apron dryer is manufactured by The National Drying Machinery Co., Lehigh & Hancock Sts., Philadelphia 33, Pa.)

Check 1088 opposite last page.

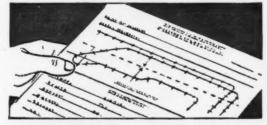


For lower costs down the line make your belt conveyors

# PRE-BILT by LINK-BELT

Belt width, inches	Capacity in tons per hour at belt speed of 100 FPM		Maximum lump size, inches		Maximum recommended belt speed, FPM		
	Weight of material, lbs. per cu.ft.			Sized	Unsized	Half maximum	Maximum
	50	75	100			size lumps	lumps
18	27	40.5	54	3	5	400	300
24	50	75.0	100	41/2	8	500	400
30	81	121.5	162	7	10	600	450
36	117	176.0	235	8	14	650	500

**EASY SELECTION.** Your Link-Belt engineer will help you choose the best combination from a wide selection of PRE-BILT sectional belt conveyor components.



**PROMPT ESTIMATES.** From standardized data, an "on-the-site" quotation can be prepared covering the components for your needs.



**SPEEDY DELIVERY.** Standardized parts are shipped from the nearest of 8 plants. One-source availability eliminates the delay of coordinating purchases from several suppliers.



FAST INSTALLATION. Due to simple construction and shop-assembled components, you can do your own erecting. Link-Belt also furnishes complete erection service and supervision.

Link-Belt PRE-BILT sectional belt conveyors combine operating efficiency and economy to give you years of dependable, profitable operation.

For full information on these durable conveyors up to 36 in. wide—with drives up to 40 hp, 24 and 42-inch truss depths—contact your nearby Link-Belt office, or send for Book 2579.



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LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.



**NEW SOLUTIONS** 

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horizontal tube bundle which handles raw gasoline vapors. Separating the two sections is a mist eliminator through which moisture ladened air passes from water cooled section and upward through air cooled section. This air flow is drawn upward by three suction fans located at top of



All controls for evaporative cools are centrally located

Mist eliminator consists of a York wire-mesh blanket which removes entrained moisture particles from the air, and returns them to the water recirculation system. Use of eliminator section above spray section prevents coating of upper tube section and fan blades with precipitated solids from the water, lengthening life of unit and saving water.

Results: Single evaporative cooler occupies only 12 x 3/ area and handles four cooling jobs in continuous flow balance. Control of cooling operations - which are a keystone of entire absorption system - is simplified and sharpened. All controls are located in one spot for easy inspection and adjustment.

Entire water supply, except for moisture evaporated for cooling purpose is returned to reservoir and re-used. Power requirements are one 71/2-10 recirculating pump, and three 15-hp fan motors.

(Aero-Vap Cooler is manufactured by Drayer-Hanson Division, National - U. S. Radiator Corp., 3301 Medford Street, Los Angeles 63, Calif.) Check 1091 opposite last page

Check 1090 opposite last page.

OCTO CHEMICAL PROCESSING

Koppers' Kobuta plant 'polishes' styrene with cotton filter

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Removes all specks from clear plastic raw material

Problem: All styrene monomer, made at Koppers' Kobuta plant, located in Monaca, Pa., that is used for making plastic, is filtered as a last step to remove all microscopic particles that might have crept in during final stages of manufacture and handling.

Any foreign particles contained in styrene used for making clear plastic products would show up in the final molded item.

Solution: Plant started using wound-cotton filter cartridges about four or five years ago. They house them in banks of 20 to 25, with two housings used in parallel. Stainless steel pipe is used for the monomer filtrate.

Results: These filters efficiently remove any specks or particles greater than 5 to  $25\mu$  that might be present in the final monomer product. Filters have also been found to be very efficient in removing suspended solid and gummy contaminants.

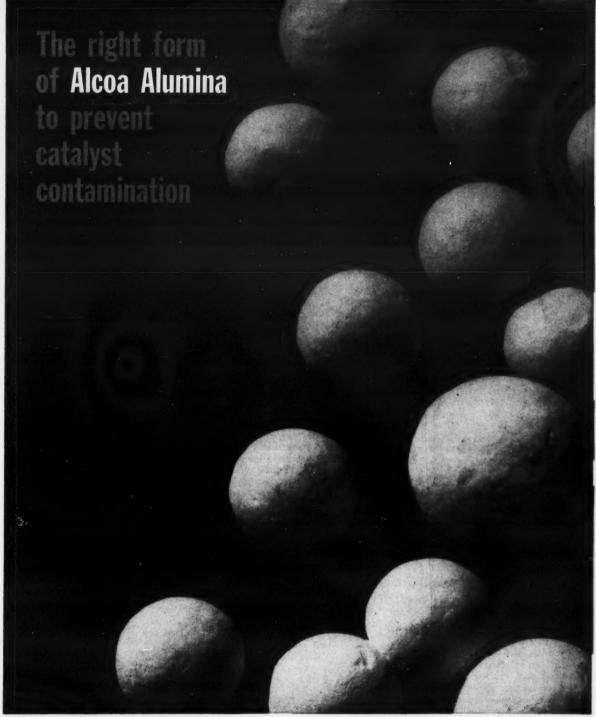
(Fulflo filters are products of Commercial Filters Corp., Dept. CP, Melrose, Mass. . . . or for more information check 1092 on form opposite last

# FOR MORE

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service slip opposite last page of this issue. Fill in slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.



Tabular Balls for bed supports, packing and covers—Neutral, nonreactive, highly refractory and abrasion resistant, ALCOA® Tabular Alumina Balls will not contaminate catalysts or influence reactions. Of highest purity sintered alumina (+99.5% Al<sub>2</sub>O<sub>3</sub>), they are unaffected by oxidizing or reducing atmospheres below 3500°F... are practically insoluble in acid and alkaline solutions.

They are available in sizes from 1/8" to 3/4" diameter—and in grades to meet specific needs.

Don't let contamination raise your catalyst costs! Use Alcoa Tabular Alumina Balls for bed supports, covers and packing. For detailed information and samples, write Aluminum Company of America, Chemicals Division, 705-K Alcoa Building, Pittsburgh 19, Pennsylvania.



"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

Check 1093 opposite last page.

OCTOBER 1957

#### **Pulverizes and classifies** 90 tons mica per day to exact particle size

Mining firm uses air system to do entire operation

This year, Petaca Mining Co., Santa Fe, N. M., has expectations of becoming world's largest producer of ground mica. Petaca is using compressed air to pulverize and classify mica to exact particle size specifications demanded by building trades.

Process eliminates "iron contamination" besides producing various closely controlled end particle sizes.

In the compressed air process, mica is mined, processed, and finally fed to pulverizing and classification system at  $-\frac{1}{2}$ " and +18 mesh.



Mica is pulverized and classified to exact particle size specifications in compressed air process

Wet or dry mica is fed by screw feeder into pulverizing chamber. Here mica is impacted against itself, while entrained in two directly opposed, high velocity streams of air. It is then carried to classification section above grinding chamber which provides control of end product. This is done by controlling rotational speed of classified blades and amount of fan air introduced in this section only particles of suitable size are discharged from the mill.

Oversize particles are returned to points at the ends of opposing high pressure air nozzles for further reduction. After discharge, particles

# keep hard-to-hold fluids in hand with Hamer Valves!

When the service conditions are tough and a lot is riding on the valves performance, play it safe, specify and install a Hamer Valve. Why a Hamer Valve? The reason is simply proven dependable performance ... a performance that has measured up time and time again under some of the most crucial service conditions to which any valve has ever been subjected. Why are Hamer Valves so outstanding? We feel it is because of the extra measure of effort given to their design and manufacture. Hamer Valves are made slowly, carefully. Each valve part is individually inspected, each valve individually tested, each customer order analyzed to be sure the valves ordered are the right ones to do the job expected of it. Nothing is left to chance or guess. To be sure, you will pay a little more for a Hamer Valve. But the unmatched performance, makes the additional cost well worth it for these fine Hamer Valves, truly a valve without equal.

# Hamer VALVES, Inc.





#### HAMER LINE BLIND VALVES

No contamination allowed here...

World-wide usage of the Hamer Line Blind for over two decades where absolute blanking of a line is required, is proof positive of this valve's effectiveness. In addition, these remarkable valves will actually pay for themselves through savings. gained by fast one man, one minute

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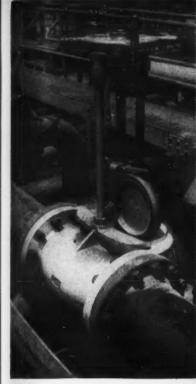
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P.O. BOX 1851, 2919 GARDENIA AVE. LONG BEACH, CALIF. REPRESENTATIVES THROUGHOUT THE WORLD

CHEMICAL PROCESSING









#### HAMER PLUG VALVES

# can't stick ever!

The plug adjusting nut, an exclusive feature on all Hamer Plug Valves permits the plug to be lifted slightly from its seat, making it easy to open or close the valve. A simple turn lowers the plug back into its seat and holds it there in perfect alignment. No matter what the service conditions, or lapse of time between operations, this outstanding Hamer feature assures POSITIVE E-Z Turn control of the plug at all times.



# This Lift-Type Plug



Leakproof Shutoff,

#### Foolproof line shut-off

HAMER VISIBLE WEDGE

A new high in safety, stability and simplicity of operation is incorporated in this outstanding rigid-type Visible Wedge Blind Valve. Precision metal-to-metal fit of the wedge and seats, plus dependable seal rings, provides a foolproof line shut-off that's both positive and permanent.

Send for Free Literature **Bulletins on all Hamer Valves are** available and will be sent upon request

#### VALVES

HAMER "POSITIVE ACTION"

block and bleed arrangement.

Check 1094 opposite last page.

are conveyed (still in air suspension) to collection system and deposited in bins.

Operation has capacity of 90 tons per 24 hr. It is powered by 2500 cfm of free air, compressed to 100 psig, and heated to 800°F. Compressed air is created by a vertical two-cylinder compressor working in unison with a vertical three-cylinder compressor equipped with after-cooler.

(Air pulverizer is manufactured by Majac Inc., Dept. CP, 23rd St. at PRR, Sharpesburg, Pa. . . or for more information check 1095 on form opposite last page.)

(Compressors are manufactured by Worthington Corp., Dept. CP, Harrison, N.J. . . . or for more information check 1096 on form opp. last page.)

#### **Cooling water treatment**

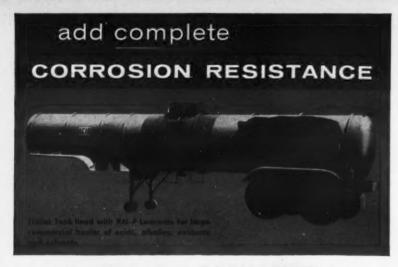
Case history of treating cooling water to minimize cooling tower deterioration and prevent corrosion at the Delhi Natural Gasoline Plant in Louisiana is discussed in 12page technical paper. Tech Paper 137 - Betz Laboratories, Inc., Gillingham & Worth Sts., Philadelphia 24, Pa.

Check 1097 opposite last page.



"That's right. I've just discovered a catalyst for Formula R-26."

SSING



### ...with KEL-F LAMINATE lining



100 gal. Tank lined with KEL-F Laminate handles acid fluorides.



Reactor-pot, cover and nozzles lined with KEL-F Laminate.

Make ordinary equipment—tanks, vessels, pipe, chutes, ducts, hoppers, vats, drums—resistant to gases and liquids as corrosive as fuming nitric acid—with KEL-F Laminate.

TOUGH—SHATTERPROOF—Kel-F\* Laminate is a durable, abrasion resistant, chemically inert fluorocarbon plastic, bonded to a glass-cloth backing for maximum adhesion. It is readily cemented to any material of construction—metal, wood, concrete, etc.—and over a variety of contours.

HEAT-SEALED SEAMS—KEL-F being a thermoplastic resin, seams may be "welded", on the job by the thermal pulse technique, into a continuous lining having zero water absorption and extremely resistant to acids, alkalies, oxidants and solvents at temperatures up 350°F.

CERTIFIED APPLICATORS—KEL-F Laminates are manufactured by the United States Gasket Company, pioneers and leaders in fluorocarbon plastics, and are available for installation by certified applicators. Write for further information and the name of applicator nearest you.

Camden 1, New Jersey

\*Trademark, Minnesota Mining & Mfg. Co.

4-inch pipe coupling lined with KEL-F Laminate for sulfuric acid service.



United States Gasket

asket Plastics Division
OF THE GARLOCK PACKING COMPANY

Check 1098 opposite last page.

Does the processing of small, special batches cut into your regular production schedule? Why not take a tip from Polymel Paint Company who installed high-speed portable unit that...

# disperses, blends, and homogenizes inside 55-gallon drum

TED F. MEINHOLD
Associate Editor
With C. G. LACROSSE, JR.
Production Manager
The Polymel Paint Company
Baltimore, Maryland

Problem: Small orders for paint — involving about a drum or two — were interfering with the regular production schedules at The Polymel Paint Company, Baltimore, Maryland. Company was proud of its reputation for

prompt delivery to its customers and wanted to continue that way. Production facilities, however, were sorely overtaxed and it was becoming increasingly more difficult to fit these small special batches into the regular schedule.

Solution: Based on experience they had gained with a small high-speed mixer in the laboratory, company decided to get a large, commercial size unit for the plant. Mixer was chosen primarily because of its efficiency and mobility. Mounted on a block and fall



Mixer operates at peripheral velocities of more than 100 ft/sec. It produces uniform mixing, with no stratification, and little surface boil and vortex



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Mounted on block and fall chain, high-speed mixer is used to mix small batches of paint right inside dram

CHEMICAL PROCESSING



Top performance of small laboratory mixer gave company idea of using large unit in plant

chain, the unit is used to mix paints right inside a conventional 55-gallon drum. Mixer can be moved from one drum to another without difficulty.

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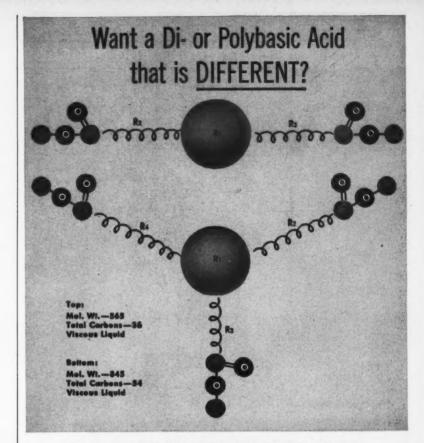
Mixer operates at peripheral velocities (along outer periphery of rotating rotor) of more than 100 ft/sec (see CHEMICAL PROCESSING, June 1955, page 124). It produces uniform mixing, with no stratification, and little surface boil and vortex. In operation, entire mass of material being mixed is kept in constant circulation, drawing in at the open base of rotor sleeve (filling vacuum created by ejection of material at top of sleeve and pull of rotor), then striking baffle plate and turning down to repeat cycle until

thoroughly mixed. Circulation is set up as soon as rotor is in motion.

Mixer has a 41/2" diameter mixing head, assembled with a 20° pitch rotor. It is designed to operate with interchangeable rotors, increasing its versatility. Unit can handle mixes with viscosities up to 30,000 cp. It produces relatively homogenous emulsions and dispersions in particle sizes ranging from less than 1 to about 50-75 microns. All parts coming in contact with material being mixed are made of stainless steel. Mixer is powered by a 3-hp, 3600-rpm, 220/ 440 volt, 60-cycle, explosionproof motor.

Results: Processing small,

Turn to next page



### Then try EMPOL® POLYMERIZED ACIDS!

Relatively low in cost, these viscous liquids offer a very unusual combination of high molecular-weight and polyfunctionality that should be of extreme interest to manufacturers of resins, polyesters, polymers and similar type materials for many fields of application. Such fields already include adhesives, coatings, corrosion inhibitors, de-emulsifiers, emulsifying agents, films, foams, lube additives, elastomers and surface coatings.

In addition to commercial Empol 1022 which contains 75% dibasic and 22% tribasic acids, Emery offers several "development" grades that are essentially all dibasic or tribasic. This added flexibility of composition offers additional opportunities for research in new fields as well as the fields where the commercial product is already used. Mail coupon below for complete literature on Emery Polymerized Acids.



Organic Chemical Sales Department

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio

	Emery Industries, Inc., Dept. K10, Carew Tower, Cincinnati 2, Ohio
	Please send literature on Emery Polymerized Acids. I am especially interested in _ dibasic, _ polybasic materials for
	NameTitle
	Company
	Address
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Check 1099 opposite last page.

### THESE RESINS GIVE YOU NEW ANSWERS TO PRODUCT AND PROCESSING PROBLEMS



New improved Exon 900 series ) with tailored blending qualities means faster, more versatile production

#### ... typical of the pin-pointed properties in Exon Vinyl Resins

Here is another addition to Firestone Exon's growing list of pin-pointed answers to specific problems: the new improved Exon 900 series.

These three new polyvinyl chloride resins offer many profitable advantages. The most important is greater versatility in both production and in the products you can make. For now Firestone gives you tailored blending to answer product and processing problems.

Firestone engineers have improved both the absorptive and adsorptive qualities of these new PVC resins. As a result, you get a greater pre-mix blending range, whether running hot or neutral. You can blend greater amounts of monomeric or polymeric plasticizer in

the formulation. You get a wider area of temperature control.

To these temperature-tailored resins add the advantages of faster solvation, faster fusion rates in Banburys and mills, high quality, less fisheyes, greater product uniformity. New Exon 900 series resins give you greater dollar economies through quicker production.

Exon 911, 921 and 931 are just three of the resins in industry's most complete line of versatile vinyls. Another reason industry looks to Firestone Exon for engineered answers to its needs.

Consider your own production or product problem. Then for the resin properties pin-pointed to the best solution for you, check with Firestone.



#### CHEMICAL SALES DIVISION: FIRESTONE PLASTICS COMPANY DEPT. 78M. POTTSTOWN, PA. . A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

IN CANADA, CONTACT CHEMICAL BALES DIVISION, FIRESTONE TIRE AND RUBBER COMPANY OF CANADA, LTD. HAMILTON, ONT.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

#### **NEW SOLUTIONS**

#### Portable Mixer

Starts on page 72

special batches no longer presents a problem. Regular production schedules are not affected. Use of mixer has resulted in considerable savings in time and expense, according to Polymel. Approximately four batches, consisting of from 30 to 40 gallons, are handled by the unit on an average day. Each batch usually taken about an hour. Mixer is cleaned by simply flushing it in drum of solvent or detergent. It has been used on all kinds of paint and has not required any maintenance to date.

(Jet mixers are product of the Hermas Machine Co., PO Box 166, Hawthorne, N. J.)

Check 1101 opposite last page.

#### Installation time for pipe and fittings cut by 70%

Joints made quicker and easier at petrochemical plant

Problem: Engineers at Koppers Company polyethylene plant at Kobuta, Pa., found that conventional threaded pipe installation developed leaks at joints. These leaks had to be corrected by backwelding. Sometimes backwelding had to be done 100%. All this created delays in installation and higher labor costs. Besides, resultant system was often studded with unsightly welds.

Solution: Company switched to light-wall (schedules 5 and 10) non-threaded stainless steel pipe and fittings. Permanent connections are welded. An aligning connector that fits over ends of sections to be connected simplifies this operation. Connections that may later by changed are made with flanges.

Turn to page 75

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## Inside look at Aloyco Corrosion Engineering Service

This is a realistic illustration of an Aloyco line test—as it might be conducted in your plant as a regular part of Aloyco Corrosion Engineering Service.

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Whenever there is no 'book solution' to a specific valve problem, we will prepare a test rack carrying a series of alloy specimens (discs above) to be inserted in your process line. Purpose is to pinpoint the alloy that will most efficiently stand up to the specific corrosives under your actual line conditions.

Our sole purpose with the Aloyco Corrosion Engineering Service is to help you successfully solve corrosives-handling problems. Our resources are the metallurgical experience, foundry skills and engineering knowhow we have gained in twenty-seven years as the world's largest specialist in Stainless Steel Valves.

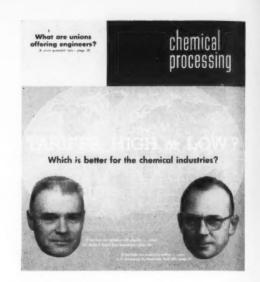
Bring your corrosion problem to Alloy Steel Products Company, 1301 West Elizabeth Avenue, Linden, New Jersey.







Can you "pay for"
a magazine like this?
with a \$3.00 or \$5.00
subscription?



#### This magazine costs more than \$40.00 per year

Maybe you've thought publishers make money on a \$3.00 or a \$5.00 subscription . . . and that is why they ask you to subscribe.

No, it's not true . . . your \$3.00 or \$5.00 fall far short of "paying" for any really good business magazine.

The costs of printing, paper and postage alone usually exceed subscription prices. Editorial costs and other expenses run to many times that amount. And usually it costs more just to sell such subscriptions than they bring the publisher in dollars. So, the publisher actually "loses money" on such sales.

**Then, why?...** yes, why do some publishers charge a nominal rate for a subscription... but other publishers send their magazines without charge?

Well, the "paid-subscription" magazine gets a lower postage rate than does the "non-paid subscription" magazine. Some publishers feel this postal advantage is important. So they charge a "token fee" as a subscription price. And so win a lower postage rate.

But—whether you pay nothing, or such a "token fee," you—the reader—do not really pay for the magazine's service.

No — advertisers pay the bills . . . and so, logically, advertisers demand the best possible coverage of the important, key men of the field. That means folks like you, who exercise buying power.

CHEMICAL PROCESSING "handpicks" its readers—for best, effective circulation . . . and sends the magazine to these key folks, without charge

You see, you simply can't get maximum coverage of important folks by trying to force them to buy subscriptions. Such men, limited in numbers, are scattered all over the U.S.A.; travel and/or direct mail cost money; a large share "forget to renew" each year; and, no matter how much time, money and pressure you put on them, there are always some important men who will never buy.

You don't "pay"—still CHEMICAL PROCESSING gets better circulation. So, as you can see, a subscription price is at best but a "token payment." You don't really pay for any magazine with \$3.00 or \$5.00.

But, CHEMICAL PROCESSING gets the best, most effective circulation coverage by "hand-picking" the right readers. This gives values to advertisers which they can't possibly get in any other way.

That's why . . . CHEMICAL PROCESSING hand-picks only qualified readers . . . The Management Team in chemical processing plants . . . presidents, partners, plant managers, foremen, engineers, chemists, directors of research, etc. Then the editors make the magazine so interesting, so valuable, these folks want to read it.\*

That's why CHEMICAL PROCESSING spends many thousands of dollars on each issue — to give you this service costing more than \$40.00 per year . . . without charge . . . as you are an important reader in the chemical field.

No, you can't "pay for" any good business magazine with \$3.00 or \$5.00. Whether you receive a "paid magazine" or a "non-paid magazine" you are still enjoying a valuable service — whose cost is far above any price you paid for a subscription.

\*Every issue proves this qualified readership . . . by unequalled response from these key readers. May we show you the evidence?

# **Chemical Processing**

FOOD RUSINESS



published by: Putman Publishing Company also publishers of: FOOD PROCESSING INDUSTRY POWER

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Starts on page 74



Section of lightwall piping system at Koppers plant. Note smooth welds

Flanged joints are made quickly. Pipe or fitting is expanded directly into flange with an expanding tool. Operation requires only vise and wrench.

Results: 'Time required for installation of pipe and fittings has been cut by 70%. Labor costs have been cut appreciably. Welds are made without damage to pipe wall, reducing material costs. Unsightly welds are gone.

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(Speedline fittings are product of Horace T. Potts Co., D St. at Erie Ave., Philadelphia 34, Pa.)

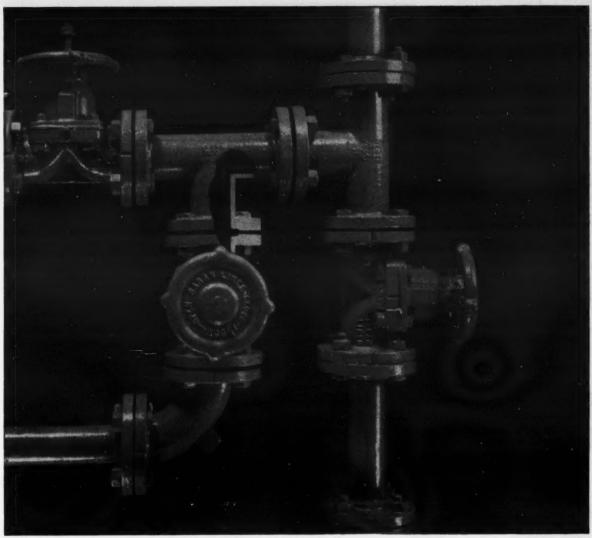
Check 1151 opposite last page.

#### Efficiently cools hot nitric acid at Abbott

Exchanger withstands action of corrosive acid

Problem: Development work for organic chemical production at Abbott Laboratories, North Chicago, Ill., required cooling and recovery of 22 to 25% hot nitric acid. Acid is circulated from oxidation reaction area through two packed stainless steel columns each 18" in diameter and 20' high at rate of eight gpm. Proper recovery meant cooling the acid from 140 to 70°F.

Solution: In February 1957 lower end of each tower was fitted with a compact shell-and-tube heat exchanger. Each unit has %" OD tubes



Whatever the piping arrangement, liquid never touches metal in saran lined pipe, fittings or valves.

# You can see why saran lined pipe cuts costly downtime

It's a rigid steel pipe lined with durable saran that corrosive liquids won't bother

Now you can pipe commonly used acids, alkalies and other corrosive liquids without worrying about corrosion. With saran lined pipe, the liquid never touches metal — in the pipe, valves or fittings. Corrosion can't get a start—downtime troubles are eliminated.

Because it is two pipes in one, steel swaged onto saran, it has high strength. In fact, saran lined pipe will withstand working pressures up to 300 psi. Saran lined valves and fittings are available for 150-psi and 300-psi working pressures. You'll get other advantages when you use saran lined pipe. It's easy to fabricate and easy to install. Conventional pipe fitters' tools can be used for cutting and threading. And you

can hang it as you would ordinary steel pipe.

If your operation can profit from long-lasting, corrosion-free piping, investigate saran lined pipe today. THE DOW CHEMICAL COMPANY, Midland, Michigan.

SARAN LINED PIPE COMPANY
DEPT. SP1594B-1
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

Please send me information on saran lined pipe, fitting	s and valves.	
Name	Title	Company
Address	СИУ	State

YOU CAN DEPEND ON



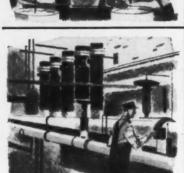
Check 1152 opposite last page.

Chromalox<sup>®</sup>
Electric

"Job-side

Heating" for anything

that's piped



#### WATER—Factory heats water for washroom

During summer boiler shut-down, this company uses Chromalox Circulation Heaters and a ceiling-mounted storage tank to provide hot water for after-work clean up. Tapped steel mounting lugs factory-welded to the heaters made installation quick and easy. Water is heated mainly at night with offpeak power at lowest rates.

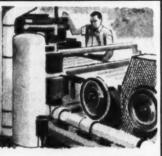
#### AIR-Aircraft factory heats air for thermodynamic testing

This nationally prominent aviation company installed seven Chromalox Electric Circulation Heaters to pre-heat air used for product testing. Four 80 kw heaters are rated for a maximum air flow of 450 lbs. per minute at 225 psi. Air enters the circulation heaters at from 90-210°F and is raised to a maximum of 900°F. Three 50 kw heaters have a maximum air flow of 250 lbs. per minute at 100 psi.



#### TRANSFER FLUIDS— Container manufacturer circulates hot oil to melt wax

As fibre drums leave this manufacturer's production line, a wax coating is applied for a smooth, grease-proof, moisture-proof interior. For a uniform coating of the desired thickness, wax must be sprayed at a constant 240°F temperature. A nozzle sprays wax up into the inverted drums as they are placed on a drain rack. As excess wax drains to a basin beneath, it is reheated and used again. The catch basin is heated by a transfer of heat from coils containing hot oil. Two 15 kw Chromalox Circulation Heaters are thermostatically controlled to keep the oil at a uniform 400°F. A separate thermostat maintains the 240°F wax temperature in the reservoir.



#### STEAM—Printing plant boosts steam temperatures to speed ink drying

A Chromalox Electric Circulation Heater is mounted alongside this press to boost steam temperature to 750° and eliminate the need for excessive boiler pressure. Although steam temperature takes a quick drop after leaving the heater, it still reaches the paper web at much higher temperatures than when the boiler alone was used and the steam had to travel a long distance.

Get the full story about Chromalex Circulation Heaters from your Chromalox Representative or write us direct for Bulletin 701 and new Case Studies.



# CHROMALOX ELECTRIC HEAT

Edwin L. Wiegand Company
7517 Thomas Boulevard
Pittsburgh 8, Pa.

ABEIE-S

Check 1153 opposite last page.

#### **NEW SOLUTIONS**



Development engineer at Abbott Laboratories adjusts flow to nitric acid recovery tower. Compact heat exchanger on lower end of tower cools hot acid

and 24.4 sq ft of cooling area. All component parts of assembly — including shell, tubes, tube sheets, end bonnets, end castings, baffles, and baffle spacers — are of 316 Stainless Steel.

End bonnets provide smooth flow with least possible impact on tubes and tube sheets. Segmented baffles are spaced to give maximum heat transfer with minimum drop in pressure. Tubes are rolled in to tube sheet by electronically controlled process, making a highly efficient joint. They are readily accessible for cleaning. Cooling water is fed to unit at 35 gpm, 68°F.

Results: Compact heat exchangers have maintained good coefficients of heat transfer while handling highly corrosive hot nitric acid. No maintenance has been necessary.

(Model SSF-504-HR-2P heat exchanger is product of Young Radiator Co., Racine, Wis.)

Check 1154 opposite last page.

#### UO, production boosted by continuous calciners at Hanford Works

Eliminate downtime required by old batch-type units

Problem: Excessive downtime was required by kettletype calciners at Hanford atomic plant, near Richland, Wash. It "bake" ranium sa uranium able for AEC site

Most of up for in cleaning reclaimed um, obtairradiated processed metal for into che diffusion Soluto

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Calciner salt

hopper salt, pour maintains "oven". tures are heating el Hot ac

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Calciner high-grad withstand 1000°F and tion of the

Results: ers have of hours while boo valuable

(Equipme General E Hanford land, Was

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Wash. Units were used to "bake" reclaimed molten uranium salt and reduce it to uranium oxide, a powder suitable for shipment to other AEC sites.

Most of the time was taken up for manual unloading and cleaning of the kettles. The reclaimed unfissioned uranium, obtained from dissolved irradiated fuel elements, is processed and refined into metal for nuclear reactors, or into chemicals for gaseous diffusion plants.

Solution: Engineers designed and installed continuous calciners. Oxide is discharged continually through a

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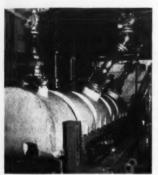
Hanford

Richland,

ESSING

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Calciner reduces molten uranium salt to uranium oxide

hopper while fresh molten salt, pouring in from above, maintains constant balance in "oven". Necessary temperatures are created by electric heating elements.

Hot acidic gases escape through special filtered exhaust pipes and no persons are exposed to radiation or radioactive contamination. Agitator paddles constantly stir mixture and prevent it from crusting on sides of unit

Calciners, constructed of high-grade stainless steel, withstand temperatures of 1000°F and resist corrosive action of the acidic gases.

Results: Continuous calciners have eliminated hundreds of hours in shutdown time while boosting production of valuable uranium oxide.

(Equipment was designed by General Electric Co. engineers, Hanford atomic plant, Richland, Wash.)

ARTIFICIAL LEATHERS PHOTO CHEMICALS PHARMACEUTICALS INSECTICIDES SYNTHETIC FIBERS DYES ADHESIVES TEXTILES LACQUERS PLASTICS

Celanese acetyl chemicals work for all industries

ACETIC ACID
ACETALDEHYDE
ACETIC ANHYDRIDE
N-BUTYL ALCOHOL AND ACETATE
N-PROPYL ACETATE
SODIUM ACETATE
VINYL ACETATE AND PROPIONATE MONOMER
PENTAERYTHRITOL

When processes and formulations require a dependable volume supply of acetyl chemicals, you're on the right track for dependability when you look to Celanese. Volume quantities are immediately available for shipment in tankcars, tankwagons or drums from distribution centers located in major industrial areas. As always, Celanese is your most dependable source. Celanese Corporation of America, Chemical Division, Dept. 591-J, 180 Madison Avenue, New York 16, N. Y.

Celanese



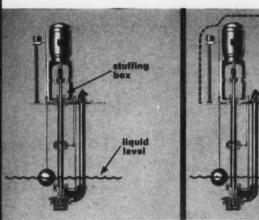
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N.Y.

Check 1155 opposite last page.

OCTOBER 1957

you stop leakage, save space, and cut costs with Yeomans

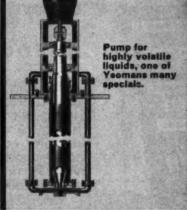
#### VERTICAL WET PIT PUMPS



**ELIMINATE LEAKAGE. Stuffing boxes** and seals are not under liquid pressure. With the Yeomans Vertical Wet Pit Pump there are no costly, annoying, or dangerous liquid leaks, as with horizontal pumps.







CUT MAINTENANCE COSTS. With exclusive Lubri-vac® bearings are kept free of abrasive matter. Lubricant pressure prevents fluids from working into bearings. Result: Bearing failures are 90% less than with conventional vertical wet pit pumps.

SPECIAL DESIGNS. 59 Years of experience has enabled Yeomans to develop many excellent special designs for pumping "problem materials." All pumps can be furnished with ferrous and nonferrous alloy parts as required. Capacity range from 5 to 10,000 g.p.m.



#### YEOMANS

Yeomans, 2003-5 N. Ruby Street, Melrose Park, Illinois

Please send me the catalog on Yeomans Heavy-Duty Vertical Wet Pit Pumps for...

solids-free

liquids solids-bearing liquids

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company		

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Check 1156 opposite last page.

**NEW SOLUTIONS** 

#### Halt quick failure of pump packing

Teflon-asbestos withstands methyl chloride attack

Problem: Original packing on shaft of positive-displacement, plunger-type pump handling methyl chloride at a West Coast chemical processing plant lasted only six days. Pump operates between 1000 and 1500 psig at 0°C. It has 3" stroke - 77 strokes per minute. Numerous packings were tried unsuccessfully, some had a service life of only one day.

Solution: Plant installed a packing consisting of Teflon and blue asbestos fibers with an inert binder, all impregnated with molybdenum disulphide and other dry lubri-

Results: Quick failure of packing has been halted. Present packing has given troublefree service for several weeks and is still in operation.

(No. 66 Dura Plastic packing is a product of Durametallic Corp., Kalamazoo, Mich.)

Check 1157 opposite last page.

#### Ceramic coating material aids peacetime battle against atom hazard

Makes working quarters safe from radioactivity

Problem: One of the most harrassing difficulties atomic research scientists at Brookhaven National Laboratory, Upton, L.I., had to overcome was making their own working quarters safe from radioactive contamination. Building in one highly vulnerable area housed filter and other water treatment units used in processing uranium fuel elements.

Normal water spillage from this installation resulted in radioactive salts being deposited in pores of concrete walls. Only by making wall surfaces impervious to this penetration could effective decontamination be achieved. Painting the walls proved ineffective.

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Alconox the world famous hospital and laboratory detergent now has

a twin brother. Whether you wash your delicate glassware, instruments and equip-ment by hand or by machine, we have the product that will do the job faster, better and safer than any detergent now on the market.

Paul Revere's message was dictated by the signal from Old North Church

Your decision is dictated by the washing method your laboratory

#### ALCONOX for all equipment washed by hand:

#### ALCOJET for all equipment washed by machine:

Alconox available in:		
Box of 3 lbs.—price	\$	1.95
Carton (12 boxes of 3 lbs.)	1	8.00
Drum of 25 lbs.	lb.	.45
Drum of 50 lbs.	lb.	.42
Drum of 100 lbs.	lb.	.40
Barrel of 300 lbs.	lb.	.37
(slightly higher on West	Coast)	

Alcojet available in:	
Box of 5 lbs	\$ 3.00
Case (6×5 lbs.)	15.00
Drum of 25 lbs.	1b45
Drum of 50 lbs.	lb42
Drum of 100 lbs.	Ib40
Drum of 300 lbs.	lb37
felightly higher west of	the Rockies

Order from your favorite supplies or write for literature and samples.



Check 1158 opposite last page. CHEMICAL PROCESSING





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ast page.



Hosing down walls with hot water and detergent decontaminates ceramic-coated concrete walls at Brookhaven

Solution: Ceramix, a ceramic coating material, was applied to building walls. Material was sprayed directly over concrete blocks. No special preparation was required.

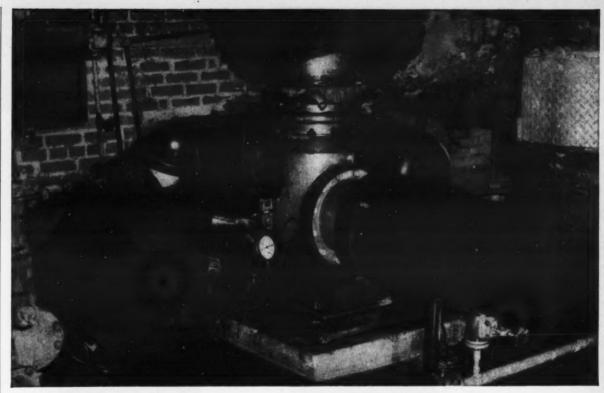
Results: Since installation of ceramic coating, decontamination is accomplished by daily hosing down of walls. Cleaning solution of detergent and hot water is used, followed by rinsing with hot water. Tests have shown that this procedure provides adequate safeguard against residual radioactive penetration of walls. Coating gives durable, impervious, highly glazed, seamless surface. Entire installation was completed in two days.

(Ceramix is product of Preco Chemical Corp., Allen Blvd., Farmingdale, N.Y.)

Check 1159 opposite last page.



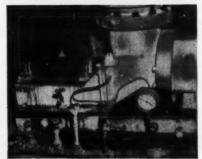
"Fine job on that adapter, . . . now wait here while I go turn on the pressure . . ."



In this elbow pump, handling 2200 GPM of mixed caustics, National Aniline expects . . .

# 2½ times the life from INCO's new anti-galling "G" Nickel castings





This was a trouble spot.

For this pump dwells in corrosives, potassium and sodium hydroxide with carbonates and organic impurities.

Once tinkering was constant . . . "down-time" high. Now, for eight months, only packing has been needed. Once 41 days to two years life was "max." Now, engineers expect five years. Once the pump was made conventionally. Now, it's "G"® Nickel cast by Inco.

cast by Inco.
"G" Nickel is a specially developed
cast form of Inco Nickel with greater

←"G" Nickel halts wear and erosion In elbow, propeller, water ring, end cap and casing, Inco "G" Nickel resists cavita-

and casing, inco G. Nicket resists cavitation-erosion. In glands and shaft . . . wear and abrasion. Made for National Aniline Division, Allied Chemical & Dye Corporation, by Lawrence Pumps Inc. resistance to galling . . . the same resistance to abrasion, corrosion and erosion and the same mechanical

Maybe "G" Nickel would help you overcome trouble. Or, maybe you should explore Inco's seven other casting alloys . . . each developed to provide strength and resist corrosion, abrasion, erosion and other conditions.

#### Get this new booklet

"Cast to Outlast," new 16-page booklet shows how to apply Inco alloys. Gives basic properties, how to machine and join. Just write.

The International Nickel Company, Inc. 67 Wall Street New York 5, N. Y.



inco Castings . . . Sand, Centrifugal, Precision

Check 1160 opposite last page.



NOW Taper-Lock Double Strand Sprockets are available-from stock-ready for the shaft without re-machining!

They offer all the advantages of Taper-Lock mounting. Easy on! Easy off! Precision machined at the factory, they come to you with accurate, concentric bores -insuring full contact between hub and shaft. Taper-Lock grips with the firmness of a shrunk-on fit!

There is no flange, no collar, no protruding part. Flush design means safety... If the sprocket becomes worn, you replace only the tooth part. The bushing is used again and again. And Taper-Lock bushings are lings and Conveyor Pulleys!

Taper-Lock Sprockets and Dodge Roller Chain (made to ASA standards) are stocked by Dodge distributors. Single Strand sizes range from No. 40 to No. 160, up to 112 teeth; Double Strand from No. 40-2 to 80-2, up to 102 teeth. Write for Bulletin A-644 containing selection, installation and maintenance data.

DODGE MANUFACTURING CORPORATION 6200 Union Street, Mishawaka, Indiana

interchangeable in Dodge Taper-Lock Sheaves, Coup-



CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



#### TAPER-LOCK CHAIN COUPLINGS

Accommodates common minor shaft misalignments.. Provides strong, compact coup-ling. Available with covers, for appearance, safety, dirt protection and lubrication which increases coupling life.

**NEW SOLUTIONS** 

#### Air-supported warehouse provides needed storage at about \$1 per saft

Unit can be easily erected at any suitable site

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Temporary warehousing, completely erected at cost of slightly more than \$1 per square foot, is providing essential storage for Chemstrand Corp.'s Decatur, Alabama, plant. Erected on turf floor site, structure is used for storing miscellaneous raw materials and finished products until permanent building can be erected.

Mobile warehouse was purchased to make available necessary covered space during extensive expansion of facilities. It can be taken down and re-erected at any other suitable site. Warehouse is made of vinyl-coated nylon fabric, inflated at site and held tautly in position by low-pressure air from a continuously operating blower. A 4x8' door provides easy passage with fork lift truck. Unit provides 40x80' unobstructed storage

(Air-supported warehouse was supplied by Cid Air Structures Co., 1501 E. 96th St., Chicago 28, Ill.)

Check 1162 opposite last page.

#### Flue dust recovery trouble, stack corrosion problem KO'd by plastic scrubber

Over 3 years operation, no stack deterioration

Problem: Many different types of flue dust recovery were attempted by The Molybdenum Corporation of America in producing molybdenum oxide from molybdenum sulfide at Washington, Pa. plant. Electrostatic, centrifugal, ultrasonic, and gravity recovery methods were tried and rejected.

Prior to any attempted recoveries, dry sulfur dioxide gas was vented through mild steel fume stack. During winter when condensation oc-

Turn to page 82

Check 1161 opposite last page.

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to page 82

SSING





TORQUE-ARM SPEED REDUCERS Cost less - deliver more!



TAPER-LOCK SHEAVES Easy on - easy off! Mount flush!



SC AND SCM BALL BEARING PILLOW BLOCKS "The seal won't blow!"

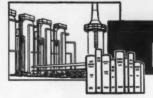
#### Write for Bulletins!

- Torque-Arm Speed Reducers. 15 sixes 1 to 100 hp. Bulletin A-637.
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661.
- Rolling Bearings—SC, SCM and Dodge-Timken. Bulletin A-638.

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Check 1163 opposite last page.



# processing and engineering data

#### HOW TO MAKE NOMOGRAPHS - II

Addition and Subtraction Charts, Parallel Axes

D. S. DAVIS

Professor of Engineering University of Alabama

Ed. note — This is the second in series on "How to Make Nomographs" by Dr. Davis. First installment appeared in August CHEMICAL PROCESSING.

Many engineering calculations depend fundamentally upon addition and subtraction. So, for our first venture into nomography, we'd better start with simple addition and subtraction charts and use parallel axes.

Let's consider the equation

H = 14,803 + 75.8 V - 167.4 Awhere H = thermal value of anthracite coal, 11,000 to 14,000 Btu/lb

V = content of volatile combustible matter, 0 to 8%

A = ash content, 0 to 24%

and all values are on the dry basis.

Draw two parallel axes at a distance of, say, 16 cm apart (see Fig 2, page 83). Let upwards be positive direction. Choose a scale factor or modulus for the V-scale so that it will be easy to construct. A good choice is 3/75.8 cm since it permits ready cancellation.

Construct the scale 3/75.8 or 3 V upward (because of the plus sign in the equation) on the V-axis at the left. Use any good centimeter scale or the natural scale on the modulus chart that appeared in August issue of CHEMICAL PROCESSING, page 73. Note that intervals of 0.2% in V correspond to distances of 0.6 cm and that the V-scale is 3(8-0) or cm long.

For the A-scale, choose the convenient modulus of 1/167.4 cm and construct the scale 1/167.4 x 167.4A or A downward (because of the minus sign in the equation). Again, use any good centimeter scale or the natural scale of the modulus chart. Center the A-scale with respect to the V-scale, solely for appearance. Note that the intervals of 0.5% in A correspond to distances of 0.5 cm and that the A-

scale is 24 - 0 or 24 cm long.

To locate the H-axis, note that the modulus of the V-scale is 3/75.8 or 0.0396 cm, that the modulus of the A-scale is 1/167.4 or 0.00597 cm, and that the sum of the moduli is 0.0456 cm. Place the H-axis between the A- and V-axes at a distance of 0.00597/0.0456 x 16 or 2.10 cm from the A-axis. To find the modulus for the H-scale, multiply the modulus of V by the modulus of A and divide by their sum:

> (0.0396) (0.00597)- = 0.00518(0.0456)

To find a starting point for laying off the H-scale, connect 0 on the V-scale and 20 on the A-scale with a straight line and mark the intersection with the H-axis. Put these values in the equation and solve for H:

H = 14,803 + 75.8 (0) - 167.4 (20) = 11,455To find the point where H = 11,000 Btu, measure downward from the intersection a distance of 0.00518 (11,455 - 11,000) or 2.36 cm. Then, to find where H = 12,000 Btu, measure 0.00518 (12,000 - 11,000) or 5.18 cm upward from H = 11,000. Proceed upward (because the sign of H is plus) in the same manner to locate H = 13,000, H = 14,000, etc.

To subdivide the H-scale between 11,000 and 12,000, lay off ten 6-mm intervals along a line at any convenient angle to the H-axis. Project these points to form the H-scale in the wellknown manner, as shown by the dotted lines.

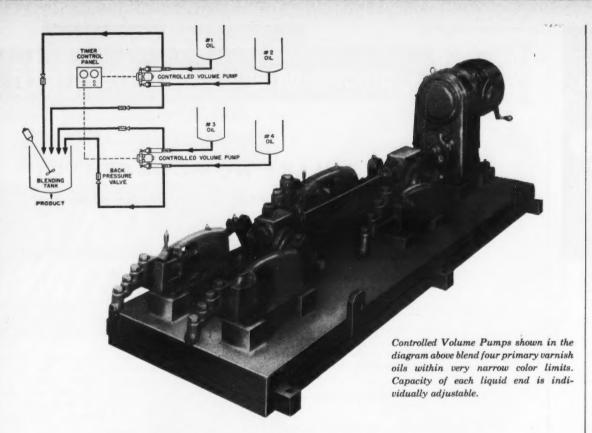
You can find a more complete treatment of addition and substraction charts with parallel axes, fortified with underlying theory, and extended to four variables in the literature.1

In November we'll deal again with addition and subtraction charts but we'll use concurrent

#### LITERATURE REFERENCE

1) DAVIS, D.S., "Nomography and Empirical Equations," Reinhold Publishing Corporation, New York,

—Chemical Processing — October 1957—



# Controlled Volume Pumps ratio and blend chemicals exactly...easily...economically

You can be sure of end-product uniformity when you formulate chemicals with Controlled Volume Pumps.

These positive-displacement pumps continuously maintain fixed ratios among all ingredients in a mix. They meter as they pump with an accuracy within  $\pm 1\%$ . A single pump can have from three to ten liquid ends.

On the pump shown above, for example, one variable speed motor drives four liquid ends. Capacities differ for all four liquid ends, yet fixed ratios can be established among all capacities. An increase in motor speed produces a corresponding increase in the quantity of chemical metered by each liquid end. The exact ratios of each chemical to another remain constant. Basic ratios can be changed by manual adjustment of stroke lengths on any or all four pumping units.

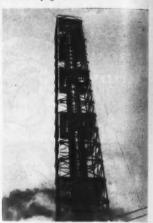
With capacities ranging to 1350 gallons per hour per liquid end, Milton Roy Controlled Volume Pumps are applicable to both pilot plant and production use. Write for Bulletin 1253, "Controlled Volume Pumps in Process Instrumentation."

MILTON ROY COMPANY, Manufacturing Engineers, 1300 East Mermaid Lane, Philadelphia 18, Pa.



Engineering Representatives in the United States, Canada, Mexico, Europe, Asia, South America, Africa and Australia. **NEW SOLUTIONS** 

Starts on page 80



Duct, pipe, fume, scrubber, and stack are all fabricated from corrosion-resistant plastic

curred, a band about onethird of way up stack would corrode very quickly.

A stainless clad steel tower was tried next, but due to corrosion its service life was limited to a maximum of eight months.

Solution: Molybdenum Corporation installed a fume scrubber fabricated from Haveg 41.

Stack is 179' tall, 5' in diameter, made of 14' flanged sections with machine flanges bolted together with gasket seals.

Results: The stack has been in operation for over three years and shows no sign of deterioration despite wet fumes and concentration of up to 5% sulfuric acid, plus SO<sub>2</sub>, plus water vapor.

(Plastic fume scrubber is product of Haveg Industries, Inc., 908 Greenbank Rd., Wilmington, Del.

Check 1165 opposite last page.

#### Drive belt gets new look

Reprint of four pages contains case history of application of 1"-wide belt replacing 10" belt on dryer drive at Bergstrom Paper Company, Neenah, Wis. "Paper Machine Cone Pulley Drive Gets the New Look" — Extremultus, Inc., 405 Lexington Ave., New York 17, N.Y.

Check 1166 opposite last page.

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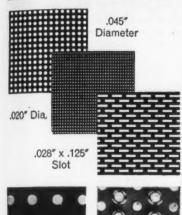
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82

# & Perforated CORROSION RESISTANT MADE FOR LONG LIFE



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Round Holes Special Burred

We are well-experienced in the perforating of screens in stainless steels, monel metal and other alloys.

Screens can be cut to shape or size with margins or unperforated areas as required. Perforated screens can be furnished in practically any material from foil thin to 1" thick.

Contact either H & K office or one of our agents. We will be glad to work with you on your perforated screen requirements.

FILL IN AND MAIL COUPON TO OFFICE AND WAREHOUSE NEAREST TO YOU.



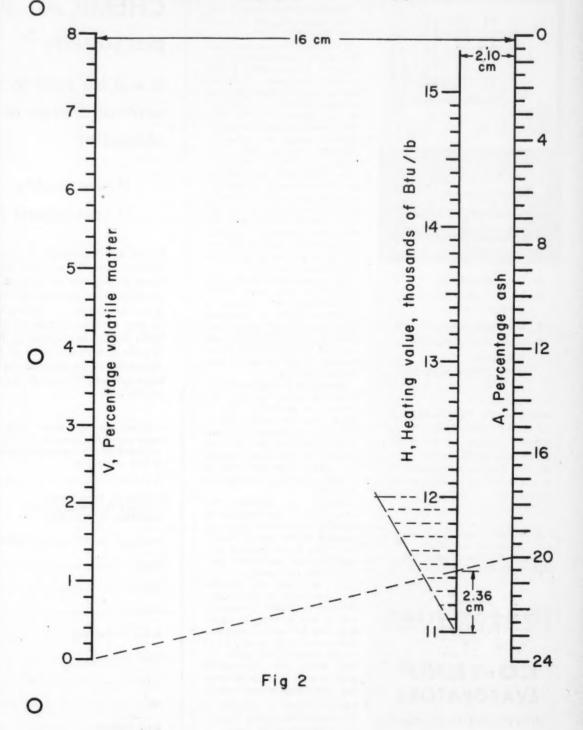
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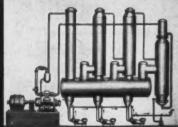
processing and engineering data

How to Make Nomographs - II Starts on page 81



-Chemical Processing — October 1957





#### for

- concentrating heat sensitive chemical solutions
- recovering solvents
- No steam required.
- Uses negligible amount of condensing water.
- Low operating temperatures.
- Less operating attention.

  adds up to

  lowest concentrating cost!

Pictured Above -

MOJONNIER TRIPLE-EFFECT LO-TEMP EVAPORATOR as installed in large chemical plant, evaporating 5,000 lbs. of water per hour from a chemical solution at a maximum temperature of approximately 40° C. The unit uses a 75 h.p. ammonia compressor.

Full details on the Lo-Temp Process will be sent you promptly. Write: MOJONNIER BROS. CO. 4601 W. OHIO ST., CHICAGO 44, ILL.



LO-TEMP EVAPORATORS

Sales Offices in Principal Cities

Check 1169 opposite last page.

**NEW SOLUTIONS** 

Thermoplastic resin binder used in Fiberglas mats won't show through

Powder form is easy-to-use, has good solubility in resins

Problem: Fiberglas mat used for plastic reinforcements required a thermoplastic binder to hold the glass fibers together during manufacturing process, at Owens-Corning Fiberglas' plant in Toledo, Ohio. Final use is in translucent corrugated panels for industrial glazing, awnings, and skylights and in plastic boat hulls.

Solution: After considerable development work, it was decided to use a solid polyester alkyd resin binder in powder form, called Atlac 363. Cut Fiberglas strands, together with 4 to 8% resin, are deposited in a predetermined ratio onto a conveyor chain.

The powdered resin does not produce a "cake icing" effect on the glass fiber surface, as might a liquid or emulsion type. Any "icing" effect renders the fibers difficult to wet out and results in the fibers showing on the surface of final molded articles.

Moving to a separate circulating air oven, the glass and binder are heated to 350 to 450°F and the binder softens and flows. Subsequent cooling causes the resin to "set" and adhere to the glass strands. The entire "mat" now acts as a unit, permitting rolling and handling.

Results: In molding, the quality of thermoplasticity permits the resinous binder to dissolve in the styrene molding. Thus, in the finished decorative sheet, the binder particles are not visible.

In the case of complex moldings such as beat hulls, solution of binder causes the mat to lose strength and permits it to be easily forced into conformity with contours which it would not easily follow when dry. Preforming glass strands and use of mating metal dies is not needed.

(Resin binder is product of Chemicals Div., Atlas Powder Co., Wilmington 99, Del.)

Check 1170 opposite last page.

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Here is a complete de-ionizer, all assembled, loaded with resins, and ready to be attached to supply, outlet, and drain lines. Whenever you need low-solids water, you should first plan on the de-ionization pro-cess to obtain it, and then consider the outstanding economy, efficiency, and easy installation of an ILLCO-WAY "Package" Unit. Three models are available, each in a wide range of standard sizes: LU Models produce a low-solids water for general use, down to 3 to 5 ppm, but not removing silica or CO<sub>2</sub>; HB Models produce quality water usually less than 3 ppm and remove all ions including silica and CO2; MB Models produce an extremely pure effluent, less than 1 ppm, free of silica and CO<sub>2</sub>. Write for literature giving complete details.





New York Office: 141 E. 44th St., New York 17, N Y. Canadian Dist.: Pump & Softeners, Ltd., London, Ont.

Check 1171 opposite last page.

processing and engineering (1718)

### Weights of Flexible Vinyl Sheeting

CARL H. BAGEN

Kaye-Tex Manufacturing Corp. Yardville, N. J.

This nomograph relates specific gravity, thickness, and weights for given areas of flexible vinyl sheeting.

It is based on the equations

w = 5.20 t s

and

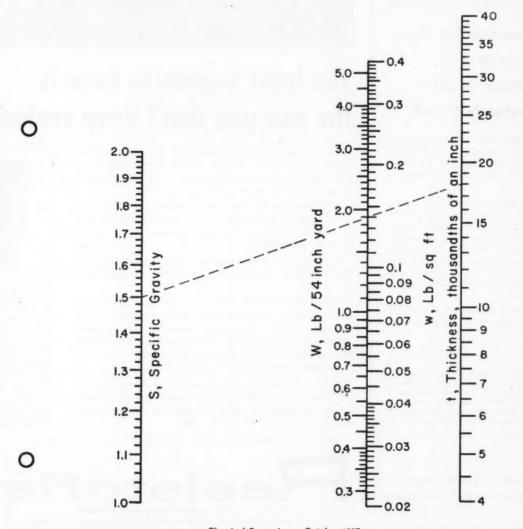
W = 70.2 t s

where w = weight of a square foot, pounds W = weight of a section 54" long and a yard wide (13.5 sq ft), pounds

t = thickness, thousandths of an inch s = specific gravity of the stock

#### TYPICAL EXAMPLE

Index line shows that a square foot of flexible vinyl sheeting with thickness of 18 thousandths of an inch and specific gravity of 1.50 weighs 0.14 lb. A section that measures 54 x 36 inches (13.5 sq ft) weighs 1.89 lb.



Chemical Processing - October 1957-

#### Other Fluoroflex-T Products



### Laminated Dip Pipe: shatter and corrosion proofwithstands 500°F

A specially laminated construction gives this Fluoroflex-T Dip Pipe the strength and chemical inertness needed for the most severe applica-

Among the particularly desirable features of this dip pipe are its resiliency and light weight. Unlike those made from other materials, Fluoroflex-T Dip Pipe is fracture proof and immune to thermal shock. It cannot possibly damage glass lined and other types of expensive

Available in standard 2" to 3" ID. Special sizes to 6" ID fabricated. Send for data.

CAUTION: Because the properties of Teflon products can be varied widely by the fabricating methods employed, the fabricator's experience and in-tegrity remain the user's best assurance of quality and performance.

Originators of high temperature fluorocarbon hose assemblies



# The least expensive hose is the one you don't keep replacing

Here are three lengths of hose. Take the one on the far right. Subjected to hot oils at high temperatures - it soon deteriorates and fails. Result: time out for maintenance - and a requisition for a new hose.

Now consider the hose in the center. Installed on a severe flexing application . . . it readily fatigues and fails. Result: time out for maintenance - and a requisition for a new hose.

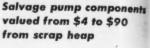
How often does this happen? Often enough to prove that "the least expensive hose is the one you don't keep replacing."

While Fluoroflex-T hose (on the far left) costs more initially, its performance actually results in real savings. Costly down-time, excessive maintenance (often at premium rates), product spoilage, interrupted production schedules, disappointed customers - all these are eliminated by Fluoroflex-T assemblies.

With its chemically inert patented tube and its blowoff proof fittings, Fluoroflex-T assemblies are ideally suited for conveying the most corrosive fluids - safely and economically. Write for data.

● Fluoroflex is a Resistoflex trademark, reg. U.S. Pat. off. ● Tefton is a DuPont trademark.

Check 1172 opposite last page.



**NEW SOLUTIONS** 

Wire thread inserts cut in. ventory costs

Problem: Prohibitive repair costs were responsible for scraping of all damaged gasoline pump components having stripped or worn threads at Atlanta, Ga. regional repair center of Gulf Oil Corporation. Under Gulf service station maintenance program, pumps are periodically removed from service for checking and complete overhaul.

Frequently, cast iron and zinc die castings that form pump air eliminator, adapters, and pressure chamber, were found to have damaged threads from incorrect installation or mishandling in use.

Since labor costs to repair a casting by oversize thread method were often more than casting was worth, all damaged castings having stripped or worn threads were discarded. This resulted in high inventory and replacement costs.

Solution: Using stainless steel wire thread inserts, the thread repair is now accomplished by a simple procedure. Damaged thread is first removed with drill same size as original thread. Hole is then retapped, using special tap, and wire thread insert is installed.

Results: Gasoline pump components valued from \$4 to \$90 are being reclaimed from scrap heap, and all damaged castings are being salvaged at minimum cost. Inserts permit use of same size screw in repaired hole as was used originally.

Preformed inserts provide threads that are stronger, more wear-resistant, and more corrosion-resistant than original threads. Inventory costs are also cut by permitting continued use of casting that might not immediately be replaceable from stock.

(Wire thread insert is product of Heli-Coil Corp., Div. of Topp Industries, Inc., Danbury, Connecticut).

Check 1173 opposite last page.

Most flexible hose prob-

lems are quickly solved for good with Fluoro-flex-T hose assemblies as proved by over

three years of continu-

ous service on the

toughest applications in aircraft, missiles, rockets, and nuclear energy.

cations: non-aging, com-pletely inert chemically and flexible over range of —100°F to +500°F,

exceptional flex life,

lightweight, small O.D., 1000 psi pressures.

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Check 1174 opposite last page.

Heat Transfer Coefficient for Turbulent Flow

> GEORGE M. MACHWART Michigan College of Mining and Technology

One of the most widely used relationships in heat transfer is the Dittus-Boelter equation. Usual form of the equation

$$\frac{hD}{k} = 0.023 \left(\frac{DG}{\mu}\right)^{0.6} \left(\frac{\mu C_p}{k}\right)^{0.4}$$

may be shortened to

= 0.023 
$$\left[ \frac{G^{0.8}}{D^{0.2}} \right] \left[ \frac{C_p^{0.4} k^{0.6}}{\mu^{0.4}} \right]$$

for limited range of temperature encountered in convection.

where h = film coefficient of heat transfer, Btu/(hr) (sq ft) (°F)

G = mass velocity, lb/(hr) (sq ft of cross section)

k = thermal conductivity, Btu/(hr) (°F) (ft)

D = inner diameter of pipe, ft

 $\mu = \text{viscosity of fluid, lb/(ft) (hr) or}$ 2.42 x number of centipoises

C<sub>P</sub> = specific heat, Btu/(lb) (°F)

A previous nomograph3 covers long form of equation. This chart deals with fluids in turbulent flow and is based on short form of the

#### TYPICAL EXAMPLE

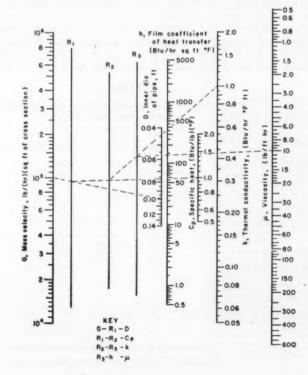
To use nomograph, draw a straight line from 105 on G-scale to 0.10 on the D-scale to intersect R1. From intersection on R1 draw a straight line to 1.0 on Cp-scale to intersect R2. From this intersection draw a straight line to 1.0 on the k-scale to intersect R3. From this intersection on R3 draw straight line to 10.0 on the u-scale to intersect h-scale at 140, the value of film coefficient of heat transfer. Use of formula results in a value of 145.

LITERATURE CITED

1) Brown, G.G. et al, "Unit Operations," p 442, John Wiley and Sons, Inc., New York, 1950.

2) Ibid., p 443

3) RYNAT, C.J., Ind Eng Chem, 35, 1187 (1943).



Consumption Pattern of Unsaturates in the US (% of 1956 consumption)

( /6 01 1 750 00		
	Oleic Acid	Unsaturated Vegetable Fatty Acids*
Chemicals	28.2	15.4
Processing	4.1	11.7
Paint and varnish		21.6
Soaps and toilet articles	20.2	13.6
Resins, plastics (inc. alkyds)	5.7	26.0
Rubber products, compounds	3.6	1.9
Lubricants and greases	5.7	
Other oils (cutting, etc.)	5.0	
Synthetic detergents	5.4	0.7
Textile uses (other than above)	9.7	0.1
Miscellaneous products *Tall oil fatty acids not include	12.6	9.2
ian on rany acids not include	-	*

# what's new in industrial uses of unsaturated fatty acids

S. A. HARRISON, Head, Process Development Section

R. B. KRON, Technical Service Manager

H. A. HAMILTON, Product Manager, Chemical Marketing Research
General Mills, Inc.
Minneapolis, Minnesota

UNSATURATED FATTY ACIDS are becoming increasingly important as chemical intermediates. The presence of one or more double bonds in the fatty acid chain gives these compounds unique physical and chemical properties.

Chain-unsaturation lowers the melting point, changes solubilities, and alters surface properties of the fatty acids and their derivatives. Each double bond provides an active site for further chemical transformation to be carried out.

#### Commercial Acids

Since it is quite difficult to completely separate unsaturated fatty acids of the same chain length from one another, the major commercial products (soy, cottonseed, and tall oil fatty acids\*) are mixtures of oleic and linoleic acids with small amounts of linolenic acid and two saturated acids — palmitic and stearic.

Three types of fatty acids, which are of less commercial im-

portance, have different compositions. Linseed acids contain mostly linolenic acid; castor oil acids have a high proportion of ricinoleic acid; and dehydrated castor acids contain from 30 to 43% conjugated  $C_{18}$  dienoic acids.

The importance of the unsaturated fatty acids is shown in the annual sales figure. This is approximately 200 million pounds annually. Present consumption, broken down by industry, is shown in table. Latest developments are given below:

Industry Uses

Organic coatings — At one time, nearly all drying oils or varnishes were based on highly unsaturated linseed or tung oils. These had a bad tendency to yellow, due to the triene and conjugated unsaturation in the linolenic and eleostearic acids.

Triene unsaturation was found to cause about five times the amount of yellowing that non-conjugated diene unsaturation does. This opened the field for fatty acids from cottonseed, soybean, safflower, and tall oils. Use of these fatty acids in making alkyds offers certain advantages:

1) Nearly all oils contain saturated fatty acids which retard drying and lower film hardness. Unsaturated fatty acids can be refined so that saturated fatty acids can be removed to nearly any degree desired.

2) Unsaturated fatty acids permit better process control because they meet close specs in color, iodine value, and titer, whereas oils may vary according to source and treatment.

 When unsaturated fatty acids are used, the alkyd manufacturer has complete freedom of choice of the polyhydric alcohol.

In coatings, when unsaturated fatty acids are esterified with polyalcohols having more than three hydroxyl groups, oils are produced which dry as well or better than linseed oil.

TABLE II

Compositions of Typical Commercial Distilled
Unsaturated Fatty Acids

Type of Fatty Acid	% Palmitic	% Stearic	% Oleic	% Linoleic	% Linolenic	ı.v.	Color	
Distilled cottonseed	27	3	24	45		102	7	
Distilled soy	17	4	27	50	2	117	7	
Fractionated tall oil (has 1 % rosin)	1	1	49	481	_	125	6-7	
Fractionated cottonseed	5	4	31	58	2	134	2	
Crystallized cottonseed (distilled after crystallization)	1.5	1.5	39	56	2	142	4	
Fractionated soy	4	5	24	61	6	148	2	
Crystallized soy (distilled after crystallization)	1.5	1.5	29	62	6	154	4	
Distilled dehydrated castor acids	1.5	1.5	11	86 <sup>2</sup>	_	155	3	
Distilled linseed	6	3	21	24	45	182	2	

<sup>1</sup>Contains 6-9% conjugated linoleic acid <sup>2</sup>Contains 30-43% conjugated linoleic acid Polvols

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<sup>\*</sup>Tall oil fatty acids are made by fractional distillation of tall oil, a by-product of the sulfate or kraft paper-making process.

Polyols with higher functionality are used to replace part or all of the glycerine in making alkyds. Excellent coating materials have been prepared in this way from soybean, cottonseed, safflower, and tall oil fatty acids.

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Another way to upgrade diene acids for use in drying oils is to isomerize them to the conjugated form by heating with alkali or acid catalysts. (In general, these oils and alkyds are poorer drying than those made from dehydrated castor oil acids).

Resin esters made by esterifying epoxy resins with unsaturated fatty acids have excellent water, alkali, and chemical resistance. Resin esters made by esterifying phenolic resins with fatty acids from semi-drying oils are also claimed to give films with excellent properties.

Refined tall oil fatty acids — modified by reaction with maleic anhydride, cyclopentadiene, or by styrenating — are used in oils and alkyds. Dimerized linoleic acid, added before esterifying, increases viscosity and improves drying properties. Similar methods may also be applied to the acids of semi-drying oils.

Cobalt, lead, calcium, and manganese salts of oleic acid and tall oil find limited use as paint driers, and as yet do not threaten the more popular naphthenic acid salts. These fatty acid salts catalyze oxidation of p-xylene to terephthalic acid, aldehydes to acids, and the cobalt, iron, and nickel salts serve as catalysts for the oxo reaction.

Soaps, emulsifying agents, detergents — Unsaturated fatty acids form the basis of many liquid and soft soaps. Potassium oleate is widely used as a liquid soap in soap dispensers.

Amine soaps of oleic acids are used in cleaning metal before plating or painting. Salts of polyunsaturated acids, although poor detergents, are used in metal degreasing and in institutional sanitation.

Sodium oleate is an emulsi-

Turn to next page



# New directions for profits...

Acrolein reacts at both the double bond and carbonyl group to produce derivatives that have uses extending from textile resins to food supplements to mold inhibitors. The following references\* indicate a few money-making opportunities with acrolein-

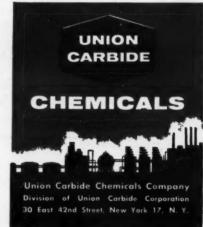
- U. S. Patents 2,738,292—2,696,477.......Acrolein resins for textiles
- U. S. Patents 2,504,425—2,676,190—2,584,496.......Methionine for food supplements
- U. S. Patent 2,665,217...... Dichlorpropionaldehyde for controlling molds

Acrolein and the following acrolein derivatives are available now in commercial quantities:

- Acrolein Dimer
  - (2-Formyl-3,4-Dihydro-2H-Pyran)
- Allylidene Diacetate
- 2-Ethoxy-3,4-Dihydro-2H-Pyran
- Glutaraldehyde
- 1,2,6-Hexanetriol
- 2-Hydroxyadipaldehyde
- 1,5-Pentanediol

Methacrolein, available now in drum quantities, undergoes many of the reactions of acrolein to produce methyl-substituted derivatives.

For more information on what both acrolein and methacrolein can do for you, send for our new booklet—"Acrolein and Derivatives" (F-40,118). Write Dept. N., Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, New York. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.



\*Nothing herein shall constitute a recommendation to practice an invention covered by any patent without permission of the patent owner.

Check 1175 opposite last page.

# HCI purification

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# "NOSEY"

THERE'S just two kinds of odors - good odors 'n bad! 'Course it's the bad one that causes trouble, 'specially if it accompanies a nice, neat product intended for retail sale. Because good as that product may be, it's in for tough sleddin' with a bad odor taggin' on. My advice is, get that odor fixed up right. Go see FRITZSCHE, pioneer odor specialists. Let them add a little gumption, a bit of "know-how," a proper combination of nice smelling chemicals, and for fractions of pennies you'll have a product everyone will want to buy.

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Check 1177 opposite last page.

#### CHEMICAL MATERIALS

#### Fatty Acids

Starts on page 88

fying agent in synthetic rubber polymerization as its solutions do not gel readily at low temperature. Sodium linoleate and linolenate, although fairly good emulsifiers, cannot be used in synthetic rubber as they retard polymerization.

Effective emulsifiers are made by esterifying unsaturated fatty acids with 400-mw polyethylene glycols or by condensing the acids with excess ethylene oxide.

Nonionics from refined tall oil are finding considerable use in "built" formulations and for industrial use - because of their moderate price and good detergent properties. Other effective nonionics are the hydroxyl ethyl amide of both saturated and unsaturated acids and the mannitan and sorbitan monooleates. Tall oil soaps can be used for making petroleum-in-water emulsions for drilling fluids.

Mild, hard-water detergents can be made by sulfating oleic

and recinoleic acids.

Vinyl resin plasticizers -Simple esters of either unsaturated or saturated fatty acids are not completely compatible with PVC or its copolymers. Introduction of polar groups (by chlorination for example) or increasing oxygen/carbon ratio converts them into good plasticizers. Many derivatives have been made and patented. These plasticizers offer low volatility, light color and color stability, mild odor, low-temp properties, and low toxicity.

Esterification of unsaturated fatty acids with ether-alcohols, give compatible and permanent plasticizers. These are claimed to give stocks with much better low-temp flex than those plasticized with dioctyl phthalate. Air-blowing has also been found to increase compatibility.

Effective vinyl plasticizers have been prepared by epoxidizing unsaturated oils and simple esters.

This produces an oxirane oxygen which can pick up HCl, thereby stopping autocatalytic breakdown of the



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CHEMICAL PROCESSING

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polymer. The stabilizing action of these plasticizers have been used in other chlorine-containing polymers, such as chlorinated rubber.

Highly chlorinated esters (35 to 70% chlorine) make inexpensive, non-burning plasticizers.

Vinyl resin stabilizers — As mentioned before, epoxidized unsaturated oils and simple esters are stabilizers as well as plasticizers. In addition, the barium, calcium, strontium, and cadmium salts of ricinoleic acid are claimed as stabilizers.

Plasticizers for other materials - Phenyl and tolyl oleate plasticize polyvinyl acetals and butyrals. The acetals are also plasticized with epoxidized oleic acid esters. Polyvinyl butyral and nitrocellulose can be plasticized with butyl ricinoleate. The lower alkyl ricinoleates also plasticize ethyl cellulose. Other alkyl esters are low-temp plasticizers for oil-resistant nitrile rubbers. Sulfurized whole tall oil makes an inexpensive plasticizer for GR-S rubber.

Applications of dimerized acids — Heating polyunsaturated fatty acids or fatty esters above 270°C gives a mixture that is mostly dimerized and trimerized acids or esters. Ratio is about 2:1.

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A polymer made from dimerized linoleic acid yields a rubber-like material, named Norepol. Since it was difficult to process and had low tensile strength, it never met with much success.

Polyamides of the type made from dilinoleic acid and ethylene diamine are used as heat-sealing adhesives, paper coatings, and in preparation of thixotropic alkyd and oil paints. In combination with epoxy resins, other polyamides yield superior coatings and excellent structural adhesives.

Flotation — Unsaturated fatty acids are used as anionic collectors for positively charged minerals to separate them from negatively charged minerals. Tall oil and tall oil fatty acids are the most widely used because of their low price and effectiveness.

Lubricants and greases — Unsaturated fatty acid deriva-

Turn to next page



Our specialty is making white oils, petrolatums and petroleum sulfonates to fit specific needs. Since we've been doing this for more than half a century, we know how to make these products exactly the way our customers want them.

Chances are, there's a white oil, a petrolatum or a petroleum sulfonate among the many types and grades in our regular line that will be just right for your purpose. But if there isn't, we'll tailor-make one for you.

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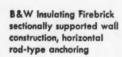
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300 Fourth Avenue, New York 10, N. Y.
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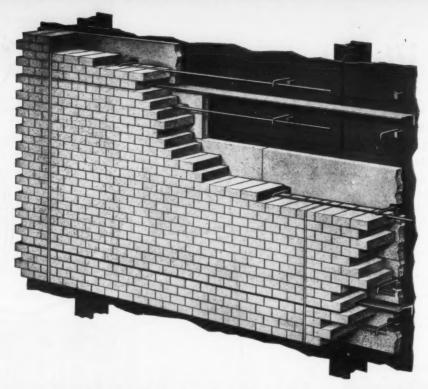
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### Can this construction cut your costs?

Simplified design and lower material costs in initial construction, ease of installation and maintenance, reduced downtime and economy of operation—these are the benefits of this lightweight insulating firebrick construction.

Here's what lightweight means. Compared with dense fireclay refractory materials that weigh from 125 to 140 lb per cu ft, lightweight insulating firebrick weigh approximately 26 lb per cu ft for B&W's 2000 degree brick. This difference provides two major advantages: (1) mechanical, which largely affects design and construction, and (2) thermal, which saves in maintenance, downtime and operation.

#### Savings in design and construction

The use of lightweight IFB simplifies engineering requirements and reduces costs. A minimum of detailing is needed, since the design is engineered around one standard shape — a feature of B&W IFB constructions.

Material requirements are simplified, too. B&W IFB can be tailor-cut, drilled or shaped as necessary, eliminating the need for costly special fired shapes, and the delays in obtaining them. Typical sections, such as burner openings, observation ports and tube supports, can be cut and shaped on the job in minutes, using ordinary woodworking tools.

Substantial savings are possible in structural steel, since insulating firebrick roof and wall constructions are lighter. In locations with soil of poor load bearing capacities, this lightweight may also result in reduced foundation costs.

These savings, coupled with B&W's engineering and service facilities available during the design phase, mean lower initial costs.

# Savings in maintenance, downtime and operation

Lightweight IFB offer a major thermal benefit—they store and conduct less heat. Heavy refractories retain heat; in the event of forced shutdown, they can cause burn-out of expensive alloy tubes, where used. The low quantity of heat stored by B&W IFB can be quickly dissipated, thus protecting these expensive tubes.

Further, this low heat storage permits faster heating and cooling. This means quicker access to the furnace in the event of emergency shutdown. Your maintenance crew can get in the furnace sooner and get it back on stream faster.

## Supplied from nearby warehouses

With the use of simplified IFB constructions, refractory repairs can be quickly and easily accomplished with standard shapes from a nearby warehouse. This eliminates costly delays in obtaining special shapes.

Anchoring devices, too, are simplified. Since there are no expensive special castings in B&W IFB constructions, carbon steel or low alloy rods can be used. These are generally available from any local steel warehouse.

#### Increased efficiency

Generally, the lighter a firebrick the better an insulator it is. Since B&W IFB are the lightest insulating firebrick made, they are the most efficient insulators. Per inch of thickness, B&W IFB provide more insulation than any other refractory material. The result is that for walls of equivalent thickness less heat is lost with B&W IFB. Casing temperatures are lower, thus improving working conditions. This means increased efficiency and reduced operating costs.



#### Fatty Acids

Starts on page 88

tives are used as corrosion inhibitors, pour-point depressants, extreme pressure ("EP") additives, and viscosity-index ("VI") improvers.

Corrosion inhibitors are found in the mono and polyesters of polyhydric alcohols and oleic acid, the oleic ester of triethanolamine, and imidazolines formed from unsaturated fatty acids by condensation with polyethylene polyamines at 250°C temperatures. Oleic acid sulfurized with sulfur-P<sub>2</sub>S<sub>5</sub> makes an anticorrosion agent in oils to reduce engine wear.

An ordinary lube oil can make an "EP" lubricant by addition of 5 to 10% of one of many modified unsaturated fatty acids or fatty esters. One of these is a sulfurized polyhydric alcohol ester of oleic acid or tall oil; a second is phosphorous-containing pentaerythritol monooleate.

A dual-purpose pour-point depressant and VI-improver is made from dilinoleic acid and deca methylene glycol. The resultant polyester has about a 22,500 mw.

Some special lubes and cutting oils do not involve a hydrocarbon oil base. A lube for metal rolling and drawing is made from a fat and tall oil; another is a mixture of an amine salt of dilinoleic acid and mercaptobenzothiazole. A cutting oil can be made from the monoester of a polyhydric alcohol and tall oil fatty acids containing rosin soap. Another is based on the oleic ester of sorbitol which has been reacted with ethylene oxide. In making soaps for greases,

the saturated fatty acids are most popular. However, addition of 10% oleic acid to aluminum stearate grease reduces transmission temp and eases production. Melting point of grease can be upped by dispersing the barium and calcium salts of oleic acid. Gel strength and working properties of aluminum stearate grease are improved by adding the aluminum soap and dilinoleic acid.

Petroleum crudes and other petroleum products — Demulsifiers for oil emuls production saturated surface-acprove adh materials phatic aramine saffatty acids tall oil she Ammoni um tallate

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In textiles. oleic ester lubricants. 4000 mw 1 used with improve u on wool. A ate can be of rayons 1 Hydraulic made fron ethers wi derivatives hol esters or ricinole Copper s

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#### Isopropyi

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Data sheet non-greasy vent and useful for tions of sk rations, an Bul 757-1-Corp., 27 Chicago 3, Check 1183

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sifiers for breaking water-inoil emulsions in petroleum
production are made from unsaturated fatty acids. Certain
surface-active derivatives improve adhesion of bituminous
materials to aggregate. Aliphatic amine and ethanol
amine salts of unsaturated
fatty acids such as oleic and
tall oil should be effective.

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Ammonium oleate or calcium tallate are sludge dispersants for oils. Sorbitan monooleate acts as stabilizer.

Miscellaneous applications -In textiles, salts of sulfonated oleic esters are used as varn lubricants. Oleic esters of 700-4000 mw polyethylene glycols used with fatty imidazolines improve uniformity of dveing on wool. Ammonium ricinoleate can be used in treatment of rayons to reduce shrinkage. Hydraulic brake fluids can be made from glycols or glycol ethers with polyoxyethylene derivatives of polyhydric alcohol esters of tall oil, oleic acid, or ricinoleic acid.

Copper salts of unsaturated fatty acids can be used as mildicides.

Hydrogenation gives the saturated fatty acid. Fatty nitrogen compounds and their uses have been covered in a previous article (see Chemical Processing, February 1957, pp 38-40). Unsaturated fatty alcohols are covered in op. cit., August 1955, pp 32-35.

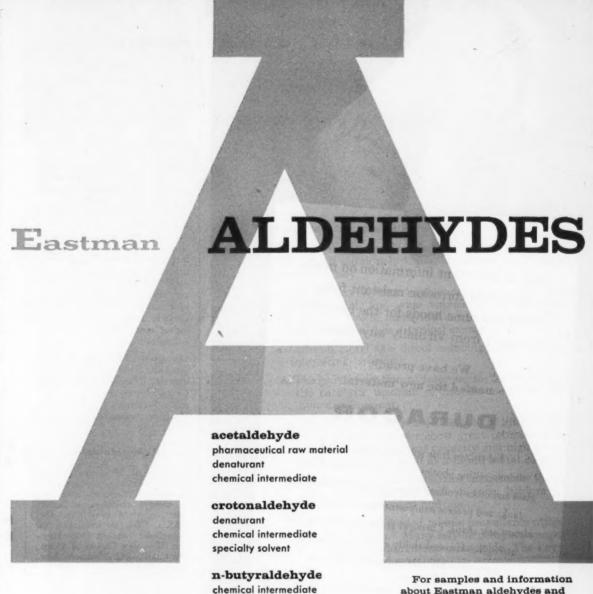
(A detailed, annotated bibliography of literature and patents concerning unsaturated fatty acids from 1936 to date is available from Mr. S. A. Harrison, Process Development, General Mills, Inc., 2010 E. Hennepin Ave., Minneapolis 13, Minn.)

Check 1182 opposite last page.

#### Isopropyl myristate

Data sheet describes distilled non-greasy, oil-soluble solvent and spreading vehicle useful for aerosols, formulations of skin and hair preparations, and bath oils. Tech Bul 757-1—Sole Chemical Corp., 27 East Monroe St., Chicago 3, Ill.

Check 1183 opposite last page.



n-butyraldehyde For chemical intermediate about 1 plastic intermediate oth pharmaceutical intermediate chemic

isobutyraldehyde

pharmaceutical intermediate resin raw material chemical raw material For samples and information about Eastman aldehydes and other Eastman industrial chemicals, call our nearest sales office or write to Eastman Chemical Products, Inc., Chemicals Division, Kingsport, Tennessee.

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Check 1184 opposite last page.

Here is important information on newly developed corrosion resistant fume ducts and fume hoods for the handling of vapors from virtually any chemical.

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CHEMICAL MATERIALS

#### High solids melting point, wide pH stability seen in anionic emulsion

Uses: As co-binder in systems such as latex paints, clay coatings, textile coatings, and adhesives. Also as low-cost binder for rock wool, molded products.

Features: Material has wide pH stability, and emulsion solids have high melting point.

Description: Anionic hydrocarbon emulsion has excellent compatibility with polyvinyl acetate, acrylic resin emulsions, neoprene, and styrene butadiene. According to manufacturer emulsion provides good adhesion, excellent water resistance, packaging and mechanical stability, uniform particle size, reduced formulating costs, and reduced can corrosion.

(Piccopale Emulsion A-22 is product of Pennsylvania Industrial Chemical Corp., Dept. CP, Clairton, Pa. . . . or for more information check 1186 on form opposite last page.)

#### Benzyl chloride data

Bulletin of 32 pages reports on properties, storage and handling techniques, and uses of benzyl chloride, a highly reactive intermediate. Bul BZYL 1-57 is available on letterhead request from Heyden Newport Chemical Corp., Dept. CP, 342 Madison Ave., New York 17, N.Y.

#### Coating resin soluble in mineral spirits

Solvated by using conventional equipment, rapid pigment wetting

Uses: As solution binder in traffic paint, paper coatings, adhesives, printing inks, and related applications.

Features: Material is soluble in mineral spirits, and can be solvated by using conventional equipment. Films which are formed by evaporation of solvent rather than oxidation show excellent clarity and are resistant to acids, alkalis, and greases. Pigments are wetted To next page rapidly.

Excerpts From The Chemical Hall of FAME



(1854-1941)

In 1915 Sabatier was awarded the Nobel prize in the numerous hydrogenation experiments which he carried out. Originally interested in physics chemistry, he later had such famous st Senderens, Mailhe, and Murat.

40 years ago Foremost's El Dorado Division la yours ago Foremost s.E.i Dorado Division his been experts in occomut oil and its by-produce for more than 20 years. Later they turned as equally expert eye on the production of fairy acids and methyl esters.

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For Example: ELDO CAPRIC ACID 94-97% pure. (Purest Capric Acid commercially produced.) Readily available at an attractive price. Eldo's high standards give you a better, more uniform end product.



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Check 1187 opposite last page. CHEMICAL PROCESSING

Check 1185 opposite last page.

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Description: Solution binder for coatings is vinyl toluene/ hutadiene resin of thermoplastic nature. It is odorless and tasteless. Films are formed by evaporation of solvent. Rate of drying depends on solvent used. It is not an oxidizing type of binder.

Color dispersions can be prepared in ball or roller mills common to coating industry. Since resin solution exhibits Gardner Color of less than one, color selection is limited only by pigment availability. (Pliolite VT is product of Chemical Div., Goodyear Tire and Rubber Co., Dept. CP, Akron 16, Ohio . . . or for more information check 1188 on form opposite last page.)

#### Report superior results in reclaming rubber with rosin oil

Uses: For reclaiming vulcanized rubber.

Features: Produces finished reclaim of higher tensile strength and lighter color than any other reclaiming oil on market. It disperses better through ground rubber than solid rosin in pan process, and has less tendency to coalesce during heating process.

Description: Rubber-reclaiming oil is suitable for use in both pan and digester reclaiming processes. Oil is an easily-handled, stabilized, liquid-type rosin.

(Bunac KS rubber reclaiming oil is product of Industrial Chemicals Div., Olin Mathieson Chemical Corp., Dept. CP, Baltimore 3, Md. . . . or for more information check 1189 on form opposite last page.)

#### Biochemicals price list

Pocket-size 22-page price list includes amino acids, purine and pyrimidine compounds, sugars and sugar phosphates, enzymes, coenzymes, biochemical reagents, and radio-chemicals. Price List, 1957 - Schwarz Laboratories, Inc., Dept. CP, 230 Washington St., Mount Vernon, N.Y. Check 1190.

LITHIUM METAL

by the GRAM or TON

Is your research specialty here?

The diverse physical properties and chemical reactions of lithium metal make it a uniquely valuable research tool. Consider these provocative uses:

- Alkyl-and aryl-lithium compounds, which are prepared from lithium metal, find wide application in synthetic organic chemistry. Use of methyllithium in the preparation of synthetic Vitamin A is a typical example.
- Lithium metal as a direct reducing agent now suggests an interesting potential.
- The polymerization of isoprene to "natural" rubber thru the catalytic medium of lithium metal dispersions is a new development.
- The military and peacetime uses of lithium metal in the field of heat transfer show great promise. Based on its low density, high heat capacity and high heat of fusion, lithium has no equal as a liquid metal coolant.
  - Lithium metal is the starting material for the production of lithium hydride and, in turn, lithium amide and lithium aluminum hydride.
  - Rocket and guided missile propellants utilize metallic "super-fuels." Many rely on complex compounds containing lithium metal or hydride. The key: lithium's tremendous reactivity.

Put lithium to work for you. Our banks of electrolytic cells can supply experimental grams or commercial tons of this admirably versatile metal. Write for details.

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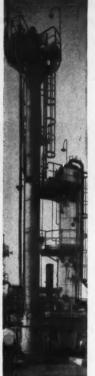
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OCTOBER 1957

Check 1191 opposite last page.



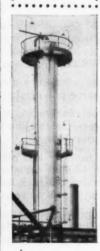


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PITT-CONSOL's new continuous process of refining has created new high quality standards in the manufacture of cresylics.

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#### PITT-CONSOL CHEMICAL COMPANY

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A SUBSIDIARY OF PITTSBURGH CONSOLIDATION COAL CO.

Check 1192 opposite last page.

# Non-toxic agent derived from sugars can complex $^{1}\!/_{4}$ its own weight of Ca<sup>++</sup> or about $3\,^{1}\!/_{2}$ times its own weight of Fe<sup>+++</sup> in a $3\,\%$ sodium hydroxide solution

# Efficiently sequesters polyvalent metals in alkaline media

#### Sodium hexahydroxyheptonate keeps frisky ions in solution

Uses: For sequestering iron and hard water salts in alkaline solution. This property can be put to use in such applications as in bottle washing compounds, alkaline paint strippers, metal cleaning and de-rusting compounds, textile processings, alkali refining of fats and oils, water conditioning, paper making, and electroplating.

A suggested use may be in decontamination of radioactives which may be insoluble in alkaline wash waters. Food uses may also be found.

Features: This chelating agent is very effective in alkaline media. (Conventional chelating agents usually have reduced effectiveness in alkaline media.) For example, one molecule of this agent holds 17 ferric ions in a 3% caustic solution. Another, commonly used chelating agent at this pH, holds one ferric ion for every two of its molecules.

In a smaller 3% caustic solution, one hundred grams of the new chelating agent will sequester 24 gm of Ca<sup>++</sup> and 350 gm of Fe<sup>+++</sup>. It will also chelate other polyvalent metals such as aluminum, copper, and nickel.

In many applications it is very important that metallic ions be kept in solution, yet as alkalinity increases, the ions begin to precipitate as hydroxides. Keeping these frisky ions in solution is where this chelating agent shines.

Description: Chelating agent is available as purified crystalline sodium hexahydroxyheptonate, primarily the alpha isomer. Product is made from an edible sugar product and is non-toxic because it can be completely metabolized by the human body. Product contains no gluconates. Molecular weight of the sodium salt is 248.

The purified crystals sell for about 50 to 65c a pound, depending on quantity. A 35%-active aqueous solution of the sodium salts of the mixed polyhydroxy sugar acid isomers is available at a cost of about 34 to 57c a pound, based on a 100% basis, and depending upon quantity ordered.

(Seqlene sequestrants are products of Pfanstiehl Laboratories, Inc., 104 Lakeview Ave., Waukegan, Ill.)

Check 1193 opposite last page.

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ОСТОВ

Synthetic gelling agent GA-10 is based on terephthalic acid. At one end is an amide linkage to which is attached a long-chain alkyl group. At the other end is a methyl ester. When saponified, it can—

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# make greases that resist shear • heat • radiation

Superior multipurpose and specialized grease lubricants for industrial, automotive, marine, and aircraft applications can be made using gelling agent GA-10, a derivative of terephthalic acid. Its ester group is readily saponified in oil (saponification number: 115-135).

The resulting metal teraphthalamate will gel many organic liquids. Besides use in grease, agent may find application in thixotropic paints and other protective coatings, and in gelled paint removers and dry cleaners. It might be used in plastigels for improved casting and forming at high temperatures.

#### **Grease Properties**

The most highly developed use is in grease-making. Valuable properties of greases made with this gelling agent are:

1) Heat stability — Sodium GA-10 greases maintain their structure above 500°F. (Sodium stearate greases have 375 to 425°F dropping points.)

Sodium GA-10/paraffinic mineral oil greases have been found to give excellent performance in hand-packed ball bearings to temperatures up to 350°F. Silicone-containing greases performed well at higher temperatures.

2) Work stability — When used, greases undergo two types of working: grinding between metal surfaces and a swirling, mild-shear action.

Grinding between metal surfaces destroys gel structure by mashing and breaking individual crystallites into fragments that can no longer form a network. In a severe roll test, sodium GA-10 grease softened 25%, while two of the

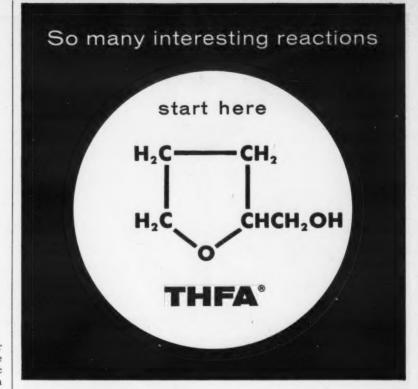
best soap-gelled greases softened 39 and 69%.

The mild-shear action occurs when grease is pumped through automatic lubrication systems and when grease is circulating in a fully packed bearing. This action apparently softens grease by separating and rearranging the network of gelling agent crystallites. In a 100,000-stroke ASTM grease worker test, sodium GA-10 greases softened from 1 to 15%. Conventional soap greases liquified beyond the penetrometer range. Lithium hydroxystearate greases softened 15% or more.

3) Radiation resistance — If radiation processes ever become commercially important, greases that won't lose their gel structure under irradiation must be used. GA-10 greases are radiation resistant.

In tests, a sodium stearate grease was severely damaged at about 100 megaroentgens of gamma radiation. A GA-10 grease was still useful after

Turn to next page



Versatile QO tetrahydrofurfuryl alcohol (THFA) is a wonderful starting point for a number of highly functional chemical compounds.

It reacts as a primary alcohol for the preparation of high boiling esters and ethers. Its ring has the properties of a cyclic ether and reacts in these unique ways:

- 1. Ring cleavage to yield open chain compounds as pentanetriol.
- 2. Cleavage and subsequent cyclization to 2,3-dihydropyran.
- 3. Cleavage and cyclization to pyridine.

As a plasticizer, a chemical intermediate or a powerful solvent for resins, gums, dyes and many complex organic compounds, THFA offers you a rich field for investigation with great promise of reward.

To aid you, we offer a comprehensive book packed with information about THFA-its chemistry, physical properties, uses and other valuable data. It's yours for the asking.

Write for Bulletin 206

# The Quaker Oats Ompany CHEMICALS DEPARTMENT



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Check 1194 opposite last page.



# End corrosion problems with

# R/M FLEXIBLE THIN-WALL Teffon HOSE

R/M's Flexible Thin-Wall "Teflon" Hose offers you an ideal solution to all kinds of corrosion problems. Made in two forms-wire braided and rubber covered-R/M "Teflon" Hose is impervious to all industrial acids, caustics and solvents. It is noncontaminating and nonabsorbent, will not harbor bacteria. It is relatively impermeable to most chemicals. It has good heat resistance, is capable of continuous service at 400°F, holds its toughness and flexibility even at extremely low temperatures.

R/M "Teflon" Hose is produced in a wide range of inside diameters and wall thicknesses. Write us for Bulletin 6700 and feel free to call on us for help in solving hose problems.

Other R/M "Teflon" products for the chemical industry include rods, sheets, tubes and tape; centerless ground rods held to very close tolerances; stress-relieved molded rods and tubes; gaskets, expansion joints and flexible couplings; bondable tape and sheets for linings; Raylon-R/M trade name for mechanical grade "Teflon"—having many character-istics of virgin "Teflon." For complete details call or write R/M. \*A Du Pont trodemark





# RAYBESTOS-MANHATTAN, INC.

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FACTORIES: Manheim, Pa.; Paramount, Calif.; Bridgeport, Conn.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

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Check 1195 opposite last page.

#### Gelling Agent

Starts on page 97

This is the equivalent radiation of about a year's service in valves for controlling the flow of liquid sodium used in a nuclear reactor.

4) Water resistance - The sodium salt of GA-10 is not soluble in water. Its greases show no emulsification after a week in a boiling water test, whereas sodium stearate greases disintegrate within four to five minutes. In many applications (such as in mining machinery and locomotives, construction machinery, and certain materials handling equipment) lubrication downtime can be reduced by as much as 95%.

5) Pumpability - The fine texture and high gelling power of GA-10 salts permit good pumpability through pressure guns or automatic feed systems. A GA-10 grease flowed faster than comparable soapgelled greases of essentially the same consistency.

6) Compatibility — GA-10 greases have exceptionally high tolerances for other types of greases. They are compatible with mixtures of sodium soap and lithium hydroxystearate greases.

Normally, mixtures of soapthickened greases have lower dropping points and bearing performance than either of the individual greases. Mixtures of GA-10 with other greases have dropping points closer to the averages of the individual greases. This is of advantage when changing grease types.

7) Oil separation - In general oil separation is less from GA-10 greases than the soap greases.

8) Oxidation resistance -GA-10 appears to be less catalytic than soaps for oxidation of oil. Inhibitors may be added to give even better resistance.

9) Toxicity - GA-10 greases have been proven innocuous. The LD<sub>50</sub> (on rabbits) for sodium GA-10 is above 21.5 gm/kg. Calcium stearate grease has and LD<sub>50</sub> of 7.51 gm/kg. Skin tests also were negative.

10) Texture - Greases made from GA-10 salts have a Turn to page 99

# U.S.I. CHEMICAL NEW

#### **Protein Nutrient Balance** Stressed in Newly Revised Study of Amino Acids

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after Water

The role of amino acids in maintaining protein quality in poultry and livestock is protein quality in poultry and livestock is given special emphasis in the fourth edition of "Proteins and Amino Acids in Animal Nutrition", by Dr. H. J. Almquist, recently published by U.S. Industrial Chemicals Co. Considerably revised and expanded, the 32-page reference work includes information

on the latest research in the field of amino acids. Tables on the amino acid composiacids. Tables on the amino acid composi-tion of common poultry feedstuffs have been enlarged, and several pages have been devoted to the effects on protein quality of heat treating soybean meal. Copies of this useful reference work can be obtained from U.S.I. sales offices or by

writing to the Editor, U.S.I. Chemical News.

#### Field Ion Microscope Uses "Matter Waves" To Visualize Atoms

A new instrument called a field ion microscope substitutes the incredibly short waves associated with atomic nuclei for those of visible light to resolve the images of atoms

in metals.

In principle the microscope is a very simple device, resembling a TV tube. It has a fluorescent screen and a fine tungsten needle corresponding to the electron gun that paints the picture on the TV screen.

A high voltage strips helium atoms of their electrons, and their nuclei then drift to the point of the needle. A powerful electric field applied between the tip of the needle and a second electrode in the tube hurls "matter waves" associated with the nuclei against the screen. Here the atomic nuclei against the screen. Here the atomic pictures appear at a magnification of 10 million diameters.

The technique is presently limited to the study of hard, simple metals, but these may serve as models for the study of others.

# **Molded Polyethylene Drums Pass Army Chemical Corps** Rough-Handling Tests

Polyethylene Containers in Steel Overpacks Promise Easier, Safer Handling and Storing of Corrosive and Sensitive Materials

A series of rough-handling evaluation tests of four types of overpacks carried out by the Army Chemical Corps indicates that containers of molded polyethylene in steel overpacks can reduce the costly breakage often experienced in shipping corrosive and sensitive materials.

Breakage sometimes exceeds 10% when material of this kind is shipped in

The chemical industry's awareness of defense needs is important to its own pros-

perity and the nation's survival, it was pointed

out at a recent meeting of the Chemical Buy-

ers Group of the National Association of Pur-

This awareness is important to the indus-

try, because new military uses for chemicals often point to profitable commercial appli-

It is important to national survival in case of attack, since much of the defense program depends upon continued production of chemicals for military equipment

and civilian supplies. Awareness of recovery plans for industry will aid in a faster

return to production and orderly flow of

materials to defense programs, a government

The chemical industry is being encour-

aged to plan for continuity of management,

chasing Agents.

spokesman said.

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boxed carboys and carboy bottles. This can be reduced considerably by polyethylene packaging according to a recent article in "Armed Forces Chemical Journal" by Kenneth D. Brunelli, Chemical Warfare Defense Needs Help Define Role of Chemical Industry Laboratories, Army Chemical Center, Md.

**Used 18 Drums In Various Sizes** 

To make its evaluation the Army Chemical Corps used eighteen molded polyethylene drums in 55-, 30-, 15-, and 5-gallon sizes, encased in overpacks. These overpacks were open-flange steel drum, solid-head steel drum, open-flange plywood drum, and wirebound crate. Also included were two molded polyethylene drums without overpacks.

Tests were conducted according to the standard procedures of the Chemical Corps for material for this use, and consisted of (1) a two hour vibration test, performed on all plywood overpacks and half of the steel and wirebound overpacks; (2) a six foot free fall onto concrete; (3) an incline-impact test, performed on the overpack units only; and (4) a leakage test. All containers were filled with water to 98% of capacity.

Polyethylene Units Showed High Degree of Burst Strength

Polyethylene units without overpacks showed to store plant designs, production tech-niques, research data, and other essential records, and to provide for plant disaster a high burst strength. They withstood the drop test, including a drop onto a 4 x 4 timber from a MORE height of over six feet.

#### Polyethylene Drum in Steel Overpack Reduces Breakage





control.





These are representative views of combination containers following rugged tests by Army Chemical Corps. (A) Five-gallon molded polyethylene drum tested without overpack is still intact after drop. (B) Thirty-gallon polyethylene drum with openflange steel overpack is still intact following a six-foot drop on

a  $4'' \times 4''$  timber. The leak that developed at plastic plug closure was readily stopped by tightening closure. (C) The drum of 55-gallon capacity with plywood overpack splintered following diagonal drop. (D) Drum in wirebound crate is still serviceable after three drop tests.

# **U.S.I. CHEMICAL NEWS**

#### CONTINUED

#### Polyethylene Drums

The polyethylene drums in combination with the steel overpacks gave the best protection to their contents, the report said. These overpacks were, however, deformed

during the tests.
All of the plastic drums in the steel overpacks came through undamaged except for one 5-gallon size, which was punctured by the steel handle of its overpack.

The plywood and wirebound crate over-packs splintered under the rough usage, and the nails and staples of the plywood overpacks punctured the plastic.

Although leaks developed at the plastic plug closures following the drop tests, the leaks were stopped in every case by simply tightening the closure.

#### Structural Failure Noted Only in One

Of the twenty polyethylene drums tested, structural failure was noted in only one a split along the top rim of a 30-gallon drum

with plywood overpack.

As a result of these tests, it is reported that the Chemical Corps has recommended consideration of polyethylene drums in steel overpacks to replace glass or ceramic liners in rigid shipping containers for corrosive and sensitive materials that are compatible with polyethylene.

#### New U.S.I. Data Sheets On Organo-Aluminum : Compounds Available

Data on four new organo-aluminum compounds, now available from U.S.I. in pilot plant quantities, are contained in recently published technical data sheets. The properties of ethylaluminum and methylaluminum sesquichlorides, trimethyl and triethyl aluminum are described in four separate sheets.

The sesquichlorides are not true chemical compounds but mixtures of alkyl aluminum dichlorides and dialkyl aluminum chlorides.

Trimethyl and triethyl aluminum are being tested as ignitors and fuels for jet engines. The entire group also shows possibilities as polymerization catalysts and as intermediates for chemical synthesis.

#### Titanium and Zirconium Studied for Surgical Uses



Titanium and zirconium have received more and more attention as materials for special surgical appliances, according to recent literature.\*

Treatment of simple fractures is reputedly successful using titanium in a multiple plate technique without plaster immobiliza-tion. Tests on laboratory animals indicate that biological tolerance is high.

In one reported test, titanium discs were inserted into muscle, and the reaction com-pared with controls of tantalum, sterling silver and phosphobronze. After seven months the titanium was found to be inert and enclosed with a fibrous tissue capsule.

Lightweight, ductile zirconium has been tested for suturing, pegs, screws, and skull plates. Zirconium compares well with tantalum, it was said, causing no measurable reaction in muscle fascia, bone, or brain, and proved superior to silver. Hemostatic brain clips of zirconium can be flattened more uniformly and hold better than those made of tantalum.

In general, comparisons between tantalum and silver and stainless steel on the one hand, and titanium and zirconium on the other, reveal net advantages for the latter two in terms either of corrosion resistance, weight, elasticity, ductility, or cost.

References Surgery, 39: 470-3 (1956); Surg. Gynecol. and Obst., 87, 212 (1948); Jour. Neuro. Surgery, 5: 359-363 (1948); Jour. Neuro. Surgery, 5: 342-348 (1948); Surg. Gyn. & Obst., 71: 598 (1940); J. Bone and Joint Surgery, 33.A: 473 (1951).

#### TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

An antiseptic coating material can be applied to objects which are handled by the public but seldom washed. It is applied by dipping, spraying or brushing, is useful for many personal articles as well.

No. 1271

Continuous sodium dispersion technology is described in α new USI brochure. Contains latest information on time-saving continuous preparation of dispersers.

No. 1272

A strippable coating is available as a protection for metals and other surfaces against alkali and acid solutions, plating solutions, etc. Can be sprayed, brushed or rolled on. Thick coating

Three controlled-viscosity release agents for rub-ber and plastic molding and for die casting of certain alloys have been developed. They are said to be odorless, smokeless, non-corrosive, non-toxic.

\*\*Ro. 1274\*

An aerosol dispenser for gibberellin, a new plant growth stimulant, has been developed. A glass vial with a metered valve provides measured dosages, is said to be both convenient and

New developments in laboratory equipment now commercially available include corrosion testers, refrigerated centrifuges, stainless steel refrigerators, test cabinets, magnetic stirrers. No. 1276

The technology of liquid metals is discussed in a recent collection of papers now on sale in book form. The work deals with many aspects of the subject from the standpoint of the chemical engi-

For joining, filling, cladding, and surfacing masonry materials, three new plastic compounds are available. A brochure describes properties of the compounds and gives instructions for their

Simple castings for atomic shields can be made from a new polyethylene-lead compound. The ratio of polyethylene to lead is variable for effec-tive shielding against specific types of radia-

The making of glass-reinforced epoxy impressions is discussed in a new booklet. Applications of this widely used system are found in metalworking and model and pattern reproduction fields.

No. 1280

#### PRODUCTS OF U.S.I.

#### POLYETHYLENE RESINS:

PETROTHENE® 100 Series-high quality resins for uses demanding outstand-

PETROTHENE 200 Series—general purpose resins for extrusion, injection, compression molding and paper coating.

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#### OTHER PRODUCTS:

Alcohelss Ethyl (pure and all denatured formulas), Normal Butyl, Amyl, Fusel Oli; Proprietary Denatured Alcohel Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

Inorganic Chemicals: Ammonia, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide, Sulfuric Acid.

Esters, Ethers and Ketones: Normal Butyl Acetate, Diethyl Carbonate, Diethyl Oxalate, Ethyl Acetate, Ethyl Ether, Acetane.

Intermediates and Fine Chemicals: Acetoacetarylides, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chioroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate solution, Urethan USP (Ethyl Carbamate).

Animal Feed Products: Calcium Pantothenate, Choline Chloride Products, Curbay, B.G. 80, Special Liquid Curbay, Ds. Methionine, Niacin USP, Riboflavin Concentrates, Vitamin B<sub>12</sub> and Antibiotic Feed Supplements, Vacalone Products.

rmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Riboflavin USP, Urethan USP, Intermediates.



#### DUSTRIAL CHEMICALS CO.

Division of National Distillers and Chemical Corporation 99 Park Avenue, New York 16, N. Y.

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#### Gelling Agent

Starts on page 97

smooth, lusterous, and highlysalable appearance due to the fine crystallite structure and easy dispersibility of the salts.

There are three steps in making GA-10 greases.

1) Dissolve GA-10 - Heat the material in oil to 250°F. (GA-10 melting point is 225-235°F.) For economy, or special properties, conventional fatty acids might be added in place of part of the GA-10.

2) Saponification - Cool the GA-10/oil solution below 140°F and add the saponifying agent. For most applications, sodium hydroxide would be the choice because of convenience, economy, and product quality. However barium, lithium, potassium, or aluminum greases can be made.

A 50% NaOH solution is added to the cooled GA-10/oil slurry. The mixture is stirred and heated to about 300-350°F for reaction.

3) Dispersion - After saponification, the sodium GA-10 crystallites are formed, but not dispersed for optimum gelling power and smoothness. The dehydrated grease is cooled to about 100 to 200°F. Dispersion is completed on a conventional grease mill. If a harder grease is desired, the grease can be discharged into a mixer for stirring.

(Synthetic gelling agent GA-10 is a product of Oronite Chemical Co., 200 Bush St., San Francisco 20, Calif.)

Check 1226 opposite last page.

#### Organic intermediates

Handy file folder contains 28 technical bulletins describing as many organic chemical intermediates offered by company. "Data File"-Benzol Products Co., 237 South St., Newark 5, N.J.

Check 1227 opposite last page.

For more infomation on product at left, specify 1228 see information request blank opposite last page.

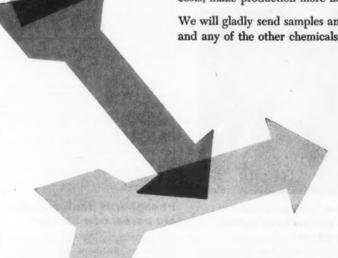
# we can serve you better

# ANHYDR OTHER RESIN

because we have more to serve you with

National Aniline Division makes the most comprehensive line of resin chemicals available today from any single source! From it you can cover your requirements, in proportion to your current needs. By concentrating your orders with National Aniline you can usually lower your delivery costs, make production more flexible and minimize your inventory.

We will gladly send samples and quote on National® Phthalic Anhydride and any of the other chemicals listed below.



MALEIC ANHYDRIDE (Tablets, Rods, Molten)

FUMARIC ACID ADIPIC ACID

Hexahydro Phthalic Anhydride Tetrahydro Phthalic Anhydride

Nadic® Anhydride

Succinic Anhydride

Succinic Acid

Malic Acid

Dodecenylsuccinic Anhydride



Akron Atlanta Boston Columbus, Ga. Portland, Ore. Providence

Charlotte Richmond

Chattanooga Chicago Greensboro Los Angeles New Orleans Philadelphia San Francisco

#### Aldehyde odorant imparts freshness to specialties

Uses: To give freshness and "life" to soaps, synthetic detergents, and cosmetics.

Features: Odorant is reported to have specific qualities not usually found in basic aromatics Floralcy, warmth, and naturalness impart freshness and "life" to perfume composition.

Description: A pure aldehyde compound, has powerful and diffusive odor recalling linden blossoms. It fills need of perfumer for floral component having smoothness and intensity, plus stability.

(Lilial is product of Givaudan-Delawanna, Inc., 330 West 42nd St., New York 36, New York.)

Check 1230 opposite last page.

#### Glutaraldehyde bulletin

Technical bulletin of four pages on glutaraldehyde (pentanedial) discusses properties of 25% aqueous solution, applications, reactions, physiological properties, and shipping data. Bul F-40005A — Union Carbide Chemicals Co., Div. of Union Carbide Corp., Dept. CP, 30 E. 42nd St., New York 17, N.Y. Check 1231.

## Silica gel, hydro gel, and silicates

Silica gel, hydro gel, and silicates, are now available from another source. Company's Cooper Park plant, in Butler, N. J., is said to have the first continuous flow process for making silica gel.

The range of typical properties of silicas now available include particle size from 3-mesh to sub-micron; bulk density from 4 to 50 lb/cu ft; moisture absorption up to 77% (wt); and surface up to 800 sq M/gm.

(Products of American Industrial Chemical Co., Div. of Amerace Corp., Cooper Park, Butler, N. J.)

Check 1232 opposite last page.

# BRIEFS FOR BUYERS

about Solvents • Sodium Sulfide

Caustic Soda • Sodium Benzoate

#### What do you dissolve?

Any discussion of industrial solvents would be incomplete without at least a mention of trichlorobenzene, tech.

This versatile material, as we produce it, is a mixture of the 1,2,4- and 1,2,3- isomers of trichlorobenzene. A clear, almost colorless mobile liquid, it typically distills within 5°C between the limits of 213° and 219°C. Like most Hooker solvents, it is nonflammable.

For dissolving fats, oils, waxes, and certain resins, and as a crystallization solvent, it offers several specific advantages which we'd like to discuss with you one of these days.

In the meantime, in case you are not aware of the variety of special-purpose solvents you can get from Hooker, here's a partial list, at right, showing specifications to which they are made.

specifications to which they are made.
If you'd like more data on their properties, ask your Hooker salesman, or clip the coupon.



#### Sulfides in new drum easier to empty or re-use in your plant

Your operators will like the convenience of this new 400-lb. drum in which you can now purchase Hooker sodium sulfide and sodium sulfhydrate.

The opening is 18 inches in diameter—4 inches wider and 65% larger in area than the former container.

This drum is much easier to empty with a scoop or shovel. It saves time and is safer when pouring, too. Flakes don't pile up around the opening when drum is inverted.

You'll also like the way this drum safeguards the exceptionally low iron content of our sulfide or sulfhydrate until you're ready to use it.

		Hooker specifications						
Solvent	Formula	Freezing Point	Dist. Range	Sp. Gr.				
Cyclehexanol: high grade tech. grade*	C <sub>6</sub> H <sub>11</sub> OH	18°C min. —10°C max.	100% within 159° to 163°C 85% within 1.5°C incl. 161.7°C	0.944 ± .0015** 0.939 ± .0015**				
ortho-Dichiarabenzene	C6H4Cl2	—18°C max.†	4°C incl. 179.5°C	1.313±.003††				
Methyl Cyclohexanol	CH <sub>3</sub> C <sub>6</sub> H <sub>10</sub> OH	Note;	155° to 180°C	0.924±.003††				
Monochlorobenzene	C6H5CI	—44°C (typical)	1.0°C incl. 132.0°C	1.113±.001††				
Monochlorotoluene	CH3C6H4CI	-28°C† (typical)	158° to 165°C	1.080±.005††				
Trichlorethylene: tech. grade extraction grade	CHCI=CCI <sub>2</sub>	-86.4°C (typical)	86.6° to 87.8°C 86.6° to 87.4°C	1.469±.002§ 1.474±.002§				
Trichlorobenzene	C6H3Cl3	10°C max.	5°C incl. 216°C	1.467 ± .007††				

 †Last crystal point. §15°/4°C \*\*25°/15.5°C

Only brand-new drums are shipped; none are re-used. A lacquer lining prevents iron pickup during shipping and storage. Six lugs hold the lid on tight, and let you reseal the drum to protect any unused product.

There's no increase in price for the new drum. To get its extra convenience and safety, just specify *Hooker* sodium sulfide or sodium sulfhydrate on your next order.

# Phosphorus pentasulfide: old horse, new blanket

Combine elemental phosphorus with sulfur—as we have been doing for more than 50 years—and you get some interesting results.

interesting results.

One of them is phosphorus pentasulfide, P<sub>2</sub>S<sub>8</sub>. This chemical was first developed in this country to make flotation reagents for copper ore. A considerable volume of it goes into special motor oil additives.

Most recently, it is helping to raise the curtain on a new field of synthesis —phosphorus-containing insecticides.

To assure good supply and fast service, we make phosphorus pentasulfide in two plants—at Niagara Falls, N. Y., and Columbus, Miss. It's available as

powder in three different particle sizes, and as a fused solid. Phosphorus content is 27.8% minimum.

For current technical data sheet, check the coupon.

### 40-page manual tells how to handle caustic soda

Written for engineers, a new 40-page Hooker manual sums up newest techniques for handling and storage of liquid country soda

liquid caustic soda.

Contents include detailed diagrams of equipment; a section on materials of construction; recommendations for unloading, diluting, piping, and storage; and a section on safety precautions and first aid.

For a copy, check the coupon for Hooker Bulletin 102, Caustic Soda Engineering and Handling Guide.

#### Quick-dissolving sodium benzoate

Every now and then we run into someone who's having a tough time dissolving powdered sodium benzoate into process. Sodium

Muriati

Like man of sodium give trouble If this has can stop it sodium ben fine flake for ter almost

Thanks ing-screeni flake stand If you'd dissolving stions, order grade is 96

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OCTOB.

# Sodium Sulfhydrate • Phosphorus Pentasulfide Muriatic Acid • Other Chemicals

Like many fine powders, this form of sodium benzoate does occasionally give trouble by balling when it gets wet.

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If this happens in your process, you can stop it for good—with Hooker flake sodium benzoate. As you see here, this fine flake form starts dissolving in water almost instantly.



Thanks to an unusually careful flaking-screening operation, the Hooker flake stands shipping well—won't dust. If you'd like to see how this quick-

If you'd like to see how this quick-dissolving flake can speed your operations, order a trial drum now. U.S.P. grade is 99+% pure; contains a max. of 0.2% benzoic acid, 0.5% water. Technical grade is also a high-quality material at 98%, with 0.4% benzoic acid max., and the remainder water.

You can get either grade in powder form, too. For complete technical data, check the coupon.

check the coupon.

#### Is the wrong kind of muriatic giving your process indigestion?

Just look at some of the things that can happen when the muriatic acid you buy isn't quite as good as it should be for your process.

If you're making benzidine dyes, for example, you know that sulfates in muriatic acid can gum up your equip-ment with an insoluble white precipi-

In refining certain high-grade metals, such as radium, sulfates can cause se-rious extraction losses. Sulfates are bad actors, too, in processing many food and vitamin products.

Iron, another impurity sometimes present in muriatic acid, can make a

product that should be white come out yellow.

Arsenic, present in some acids, can cause trouble, including formation of toxic arsine gas during metal pickling.

Finally, free chlorine in muriatic can give your production men headaches by helping to oxidize valuable components in the batch.

WHAT TO DO ABOUT IT: This brings us to the reasons why your process, if it's sensitive to any of the impurities mentioned above, will perk most efficiently when you feed it Hooker White muriatic

Hooker White is just about the purest muriatic acid you can buy in com-mercial volume. It contains a mere 0.0001% iron as maximum; only 0.003% sulfates; no free chlorine; no arsenic.

If your processing requirements are only slightly less rigid than these, you'll want to get acquainted with another member of the family: Hooker Commercial Grade muriatic. This grade contains only 0.0005% iron; 0.003% sulfates; a trace of free chlorine; no

You can get either grade in 13-gallon carboys or in rubber-lined tank cars, in three strengths: 18°, 20°, 22° Baumé. For technical data check the coupon.

If you'd like samples of either grade, please drop us a line on your business letterhead



#### New 12-page bulletin lists Hooker products

You'll find a complete listing of Hooker chemicals in this new bulletin. Indexed for ready reference, it includes under each product a short description and each product a short description and listing of properties, actual and suggested uses, and shipping containers. The bulletin also sums up major types of processing performed at Hooker. For your copy, just check the coupon for Bulletin 100-A.

#### Lanolin derivative has unusual solubilizina. solubility properties

Uses: For pharmaceuticals and cosmetics.

Features: Effective means for maintaining normal epidermal water balance and water retention are provided through use of derivative. Skin vapor transpiration is permitted to take place while wetting is resisted in manner of silicone fluids. Penetrating and conditioning properties are excellent. It is hypo-aller-

Description: Hydrophobic lanolin derivative is stable, water-thin, clear liquid fraction of acetylated lanolin alcohols. It is readily dispersed in water by means of common emulsifiers and surfactants.

(Acetulan is product of American Cholesterol Products, Inc., Dept. CP, Amerchol Park, Edison, N. J. . . . check 1234 on form opposite last page.)

#### Three amine boranes in quantities, and at moderate cost

Research quantities of three amine boranes - dimethylamine-borane, trimethylamine-borane, and pyridineborane - are now available. They are polymerization catalysts and inhibitors for acrylates and vinyl compounds. Applications as anti-oxidants and stabilizing agents are promising possibilities. Also of interest has been their utilization as selective reducing agents in non-aqueous sol-

Dimethylamine-borane and trimethylamine-borane are white crystalline materials with melting points of 36 and 94°C respectively. Pyridineborane is colorless liquid melting at 10-11°C and boiling at 65°C. Stable dimethylamine-borane is hydrolized very slowly in neutral or alkaline aqueous solutions, and does not lose hydrogen at room temperature. Trimethylamine-borane is so stable that it can be heated alone for

For more information	on	chemicals mentioned	on	this	page.	check he	ere:

- ☐ Trichlorobenzene, tech.
- □ Cyclohexanol
- □ ortho-Dichlorobenzene
- ☐ Methyl Cyclohexanol
- ☐ Monochlorobenzene ☐ Monochlorotoluene
- ☐ Trichlorethylene
- ☐ Sodium Sulfide ☐ Sodium Sulfhydrate

- Phosphorus Pentasulfide
- ☐ Caustic Soda (data sheet)
- □ Bulletin 102, Caustic Soda Engineering and Handling Guide
- ☐ New list of products— **Bulletin 100-A**
- □ Sodium Benzoate
- ☐ Muriatic Acid

Clip and mail to us with your name, title, and company address. (When requesting samples, please use business letterhead.)

#### HOOKER ELECTROCHEMICAL COMPANY

510 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

NIAGARA FALLS . TACOMA . MONTAGUE, MICH. . NEW YORK . CHICAGO . LOS ANGELES





### What Can You Do With These Startling New Chemical Building Blocks?

ADM's alpha olefins have created excitement in so many different areas that these highly reactive chemicals almost sound like a cure-all remedy. They aren't, of course. But they are startling new building blocks, both for chemical intermediates and as reactants to modify existing products.

Even though alpha olefins have been around long enough to get into commercial production, many people still haven't had a chance to get acquainted with them. A few more words in their behalf seem timely and proper.

#### **Areas Of Usefulness**

Consider alpha olefins if you are involved in viscosity index improvers, pour-point depressants, detergents, lead scavengers, leather treating, textile and paper chemicals, adhesives, plastics, polymers, or protective coatings . . . just to name a few. These are listed just to hint at areas in which alpha olefins have shown promise and can profitably stand further investigation.

#### Here's Why

Straight-chain C<sub>12</sub> to C<sub>22</sub> olefins with the unsaturation between the 1 and 2 carbon atoms come from the dehydration of purified fatty alcohols of known composition and chain length. They attain final purities better than 90%. These slender, straight molecules have remarkable metal-wetting properties. They form completely different products than olefins with side chains previously available. They generally react smoothly because of their known structure. When reacted, their derivatives are more stable against oxidation than those of the branched chain (petroleum-derived) olefins. They resist break-down under shear or moderately high temperatures.

There's much more you should know about alpha olefins. Write us. We can send literature, data sheets . . . perhaps even a sample to evaluate.

#### **Now In Commercial Production!**



CHEMICAL PRODUCTS DIVISION

742 Investors Building, Minneapolis, Minnesota

**Chemitals** from Nature's Wondrous Warehouse

Check 1235 opposite last page.

#### CHEMICAL MATERIALS

hours without change of physical properties. Pyridine-borane, being a liquid, may be used without a solvent, or it may be used in pyridine or ether solutions.

In the plastics industry, polymerization of monomers such as styrene may be catalyzed at higher temperatures by amine-boranes. Various additives for motor fuels have also been derived from the amine-boranes. Their toxic properties may make them useful in preventing bacteriological or fungus growth, for sterilization of soil, and pest control.

Manufacturer of related chemicals for bulk uses is expected to assure future availability at moderate cost. Preparation of higher molecular weight amine-boranes for special uses is practicable also.

(Three amine boranes are available from Callery Chemical Co., 9600 Perry Highway, Pittsburgh 37, Pa.)

Check 1236 opposite last page.

#### Silicone chemical pair make paper products ABhesive

Impart surface resistance to tacky, sticky materials

Uses: Paper or paper board treated with either of these silicone chemicals can be used as boxes, multi-wall bags, and wrapping paper for raw rubber, asphalt, and wax; interleaving sheets for cured-inplace polyurethane foams, epoxy castings, and phenolic laminates; and back-up sheets for labels and pressure-sensitive tapes.

Features: Either silicone treatment may be applied with conventional equipment to a wide range of paper and paper-like materials, such as kraft, parchment, glassine, or cellophane. Concentrations may be varied, and cures range from ten seconds @ 350°F to two minutes @235°F.

After curing, the silicone treatments have full anti-adhesive (or "abhesive") properties and retain them for the life of the paper stock.

Getting to the Source of your Odor Problems!

Effective odor control can be accomplished only when experience and proper facilities are combined to attack the problem at its source. That is the best reason for bringing your odor problems to Sindar specialists.

For masking ill-smelling ingredients or adding sales-stimulating fragrances, custom-made scents designed to meet specific production needs and odor preferences are available. For other causes of odor, such as oxidation and bacterial decomposition, the best solutions are Sindar stabilizers, antioxidants, fungicides and germicides.

Our service...yours for the asking... may be just the approach needed to solve your odor problems.

SIDDAR Corporation
Industrial Aromatics and Chemicals

330 West 42nd Street New York 36, N. Y.

Check 1237 opposite last page.



# What's A "New Solution"?

It's an article in CHEMICAL PROCESSING describing a new way of solving a tough plant operating problem. In each issue you will find specific "case histories" showing how these processing problems were solved. Each article states the operating problem . . . explains the process used and gives details of how problem was solved . . . shows results secured.

Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.

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Treatments are non-migrating and non-contaminating when cured, and have no effect on untreated papers when packaged in roll form or on materials with which they come in contact. Neither treatment effects any change in the appearance, odor, or handling properties of paper stock. Both impart a notable degree of water repellency.

Description: Dow Corning 22 and 23 are, respectively, a water-dilutable (40% solids) silicone emulsion and a 30% silicone solution in xylene. They can be applied to either one or both sides of the paper. A catalyst is supplied with each shipment and should be added before use. Commercial quantities are available.

(Treatments 22 and 23 are products of Dow Corning Corp., Midland, Mich.)

Check 1238A opp. last page.

#### Selection of stearic acid

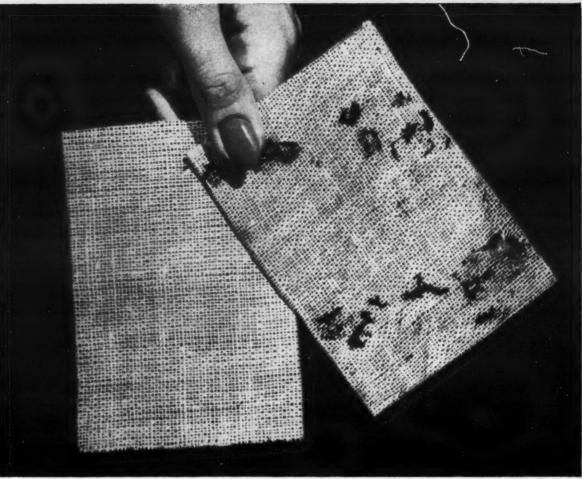
Bulletin of 24 pages aids selection of proper grade of stearic acid for each end use. It interprets results of analytical tests commonly performed on stearic acids. "Emersol Stearic Acids" — Emery Industries, Inc., Dept. CP, Carew Tower, Cincinnati 2, Ohio. Check 1239.

#### New line of colorants paint industry's first on all-purpose basis

Blending with equal success in alkyd semi-gloss and flat, oleoresinous, latex and acrylic, as well as PVAC bases, tinting color is now available to paint industry on all-purpose basis with equal, satisfactory compatibility in all types of base white paints.

Colorants are available either as one-shot tube system or in standard shelf-package form. System employs 12 basic colors which can be crossmixed.

(Universal Colors are product of The Craftint Mfg. Co., Dept. CP, 1615 Collamer Ave., Cleveland 10, Ohio . . . check 1240 on form opp. last page.)



Grey goods sample at left contains a Dowicide preservative. Sample at right does not. Otherwise, the two samples are identical.

#### Dowicide preservatives prevent product breakdown

... protect quality in textile goods

Dowicide® preservative added to liquid starch sizing protects grey goods and finished textiles against discoloration, weakening of fiber due to mold growth.

The two grey goods samples shown above were exposed to conditions favoring mold growth for an equal amount of time. The untreated sample (right) is sized with an unpreserved starch. It is discolored and weakened—costly heavy bleach must now be used to remove discoloration. In contrast, the sample sized with a starch protected by

a Dowicide preservative is unaffected by same exposure. Fourteen different Dowicide preservatives do similar quality-guarding jobs in a host of products. They're used in adhesives, agricultural products, ceramics, cordage, cutting oils, disinfectants, leather, paint and paper—to name just a few. Dow laboratories are available to help you improve the quality and lengthen the service life of your products. For more information, mail the coupon to us today. The Dow CHEMICAL COMPANY, Midland, Michigan.

Dept. DO 402C, Midland, Michigan	Please send me further information on	the uses of Dowicide preservatives for:	
		paint	☐ leather
NAME	TITLE	adhesives	☐ ceramics
FIRM	ADDRESS.	☐ building materials	cutting oils
		pulp & paper	☐ petroleum
CITY	STATE	other (specify)	

YOU CAN DEPEND ON



Check 1241 opposite last page.

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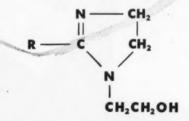
• These are a few of the characteristics and possible uses of Nalcamines that may give you profitable ideas for their application to your products:

- Cationic surface-active agents
  —can be made either water- or
  ail-soluble.
  - -Wetting agents.
  - -Foaming agents.
  - -Emulsifiers and demulsifiers.
  - -Anti-corrosion agents.
  - -Anti-static agents.
- React on an equimolar basis to form salts.
  - -Adjustable oil and water solubility.
  - -Excellent stability at low pH.
- Selectively adsorbed on many different surfaces in both oil and water systems.
  - —Improve asphalt coatings; better resistance to water stripping.
  - -Change water accepting surfaces to water repelling surfaces.

    -Provide dispersion and lubricity in rubber, plastics, asphalt.
  - -Improve paint bonding and water repellancy.
  - —Increase efficiency of flotation processes.
- ☐ IF you want wetting, dispersion, foaming or emulsification as "bullt-in" characteristics of your products, check with Nalco on the suitability of Nalcamines to do the job.

NALCAMINES are of the imidazoline (glyoxalidine) class of cyclic tertiary amines, now being manufactured with controlled purity and uniformity for practical commercial use.

TYPICAL Nalcamine structure where R is a long hydrocarbon chain.



Now the exciting possibilities of cyclic tertiary amines are practical for adaptation into commercial products with the use of Nalcamines. Control of purity and uniformity, combined with practical pricing, put the Nalcamines solidly into the class of economically-sound working chemicals.

Write today for complete data and prices. Laboratory samples or tank car lots are available promptly.

#### NATIONAL ALUMINATE CORPORATION

6294 West 66th Place Chicago 38, Illinois
Telephone: POrtsmouth 7-7240
CANADA: Alchem Limited, Burlington, Ontario
NORTHMESTERN UNITED STATES, HAWAII and ALASKA
The Plox Company, Inc., Minneapolis 3, Minnesota
ITALY: Nolco Italiano, S.p.A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH
SPAIN: Nalco Espanola, S.A.



Serving Industry Through Practical Applied Science

Check 1242 opposite last page.

28-year-old Humphry Davy discovered potassium and sodium

## 150 Years Ago This Month

Both elements are becoming ever more important in our daily lives. Here's the inside story of their discovery in October 1807

NLY 150 years ago this month — on October 6, 1807 to be exact — the seventh and the eighth most common elements in the earth's crust were discovered.

The story behind the discovery of these elements (and also of all the others) is intimately told by Mary Elvira Weeks in her "Discovery of the Elements," recently published in its sixth edition.

Time: Summer, 1807

During the summer of 1807, Humphry Davy, only 28 years old at this time, was fascinated by the problem of decomposing caustic alkalis. Davy was experimenting with saturated aqueous solutions of the alkalis and using a simple electrolytic cell. However, he succeeded only in decomposing the water.

On October 6, 1807, he changed his plan of attack. He tried an anhydrous alkali—caustic potash to be exact. Since it is a non-conductor, Davy gave it a brief exposure to air . . but let Humphry Davy tell how he did it, in his own words.

"A small piece of potash, which had been exposed for a few seconds to the atmosphere so as to give conducting power to the surface, was placed upon an insulated disc of platina, connected with the negative side of the battery of the power of 250 of 6 and 4, in a state of intense activity; and a platina wire, communicating with the positive side, was brought in contact with the upper surface of the alkali. The whole apparatus was in the open atmosphere.

"Under these circumstances, a vivid action was soon observed to take place. The potash began to fuse at both its points of electrization. There was a violent effervescense at the upper surface; at the lower, or negative, surface, there was no liberation of elastic fluid: but small globules having a high metallic luster, and being precisely similar in visible characters to quicksilver, appeared, some of which burnt with explosion and bright flame, as soon as they were formed, and others remained, and were merely tarnished, and finally covered by a white film which formed on their surfaces.

"These globules, numerous experiments soon shewed to be the substance I was in search of, and a peculiar inflammable principle the basis of potash. I found that the platina was in no way connected with the result, except as the medium for exhibiting the electrical powers of decomposition; and a substance of the same kind was produced when pieces of copper, silver, gold, plumbago, or even charcoal were employed

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for compleating the circuit." Dayy found that the new metal liberated hydrogen from the water and that the flame was caused by the burning of this gas. Because he had obtained the metal from potash, he named it potassium. Dr. John Davy, who was present when the element was isolated for the first time, said that his brother became greatly excited and almost delirious with joy.

After his successful decomposition of caustic potash. Humphry Davy attempted to decompose caustic soda by a similar method. He found that "the decomposition demanded greater intensity of action in the batteries."

Thus only a few days after the discovery of potassium, Davy was able to isolate another new metal, which he named sodium.

#### Proves Metals are Elements

However, it still remained for Davy to prove the elementary nature of these metals, which many chemists believed to be compounds of the alkali and hydrogen. Gay-Lussac and Thenard argued, for example, that since ammonium ammonia + hydrogen, potassium = potash + hy-

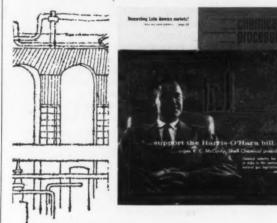
It was finally proved, however, that no hydrogen can be evolved from potassium, and that Davy was correct in regarding potassium and sodium as elements.

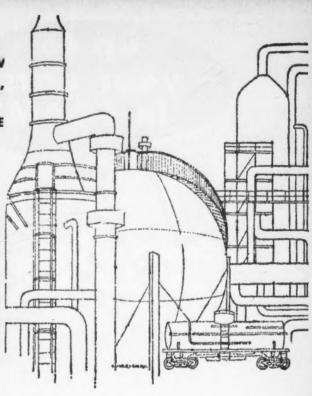
Davy's isolation of the alkali metals was brilliant in every sense of the word. It soon led to the discovery of the alkaline earth metals by a similar electrochemical method; and the alkali metals themselves were destined to become powerful tools in the search for other elements.

Davy himself later isolated calcium, barium, strontium, and magnesium. Concurrently with Gay-Lussac and Thenard, he discovered boron. (From "Discovery of the Elements, 6th Edition," published at \$10 by Journal of Chemical Education, 20th and Northhampton Sts., Easton, Pa.)

Check 1243 opposite last page.

INTRODUCING THIS NEW "EXECUTIVE SIZE" OF CHEMICAL PROCESSING MAGAZINE





This issue of CHEMICAL PROCESSING is different. Lay this copy alongside an earlier issue (before July) of CP . . . compare them. Hold the new issue in your hands . . . slip it into your brief case. It "fits" ... it invites easy reading ... for busiest-of-all chemical executives.

#### IT NAMED ITSELF "THE EXECUTIVE SIZE" . . .

for the new format has been styled for today's busy executives . . . expanded main editorial sections covering subjects vital to the management team in chemical processing industries . . . prepared in the established Putman editorial style.

#### AN EARLIER ORIGINAL DESIGN IMPROVES ...

Nineteen years ago Putman Publishing Company created the original design for business magazines, known as "King Size" . . . bringing heretofore unknown visibility and greater effectiveness in editorial presentation (yes, for advertising, too). Scores of other magazines adopted this format, and use it today.

Now, the "Executive Size" brings you new advantages ... while retaining the best of the old.

Turn to page 50. Look at the unusually effective presentation of the editorial matter . . . the "cinemascopic" widescreen layout.

Leaf anywhere through the magazine . . . editorial material everywhere . . . front and back. No solid sections of advertising pages . . . newspaperwidth editorial columns invite easy reading throughout.

We think you'll find the new "Executive Size" of CHEMI-CAL PROCESSING easier to read, more interesting. Don't you agree? We'll welcome your comments.

All Pulman magazines now appear in this new "Executive Size" . . . FOOD PROCESSING FOOD BUSINESS, INDUSTRY POWER, as well as CHEMICAL PROCESS-ING.

#### PUTMAN PUBLISHING COMPANY

III E. DELAWARE PLACE . CHICAGO II, ILLINOIS





"Executive Magazines for Industry"

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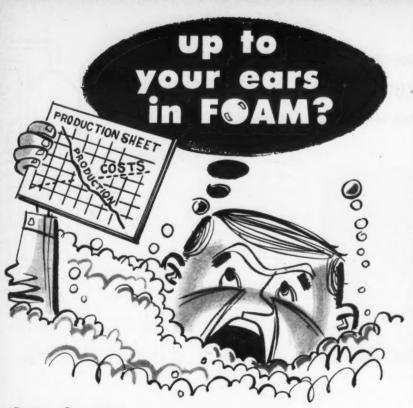
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## then change to a Dow Corning SILICONE DEFOAMER

Why continue to let foam rob you of valuable processing space, inflate your costs, smother your production schedule? Why indeed, when only a teaspoonful of a Dow Corning SILICONE DEFOAMER will prevent mountains of that wasteful foam . . . help you operate at full capacity.

Effective against even the most violent foamers, Dow Corning SILICONE DEFOAMERS are so efficient they pay for themselves many times over. And remember when you use one of these economical silicone defoamers, you also free yourself from the worry of boilovers and any fire hazards that may result.

So . . . stop choking on your FOAM problems—change to a Dow Corning SILICONE DEFOAMER.

#### FREE SAMPLE

Put Dow Corning SILICONE DEFOAMERS to the test. Use the coupon below or write on your letterhead to receive a free trial sample. No obligation, of course.



#### Dow Corning CORPORATION

MIDLAND, MICHIGAN

NAME	32	22 My foamer is
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COMPANY		Other
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		policination in the

Check 1244 opposite last page.

#### CHEMICAL MATERIALS

#### Fluoroelastomer coating gives high resistance to fabrics

Resists heat, chemicals, fuels, lubricants

Uses: In construction of fuel cells, equipment linings, protective clothing, and wherever chemical resistance is a problem.

Features: Coated fabrics are almost impervious to ozone and weathering. They possess remarkable resistance to deterioration by heat, chemicals, aircraft and automotive fuels as well as lubricants. Material will withstand total immersion in most fluids at +300°F temp.

Description: Fabrics are coated with "Viton" A, a synthetic fluoroelastomer. Coated fabrics are available in test quantities.

Glass, Dacron, and Tefloncoated glass fabric materials are available.

("Fairprene" coated fabrics are products of E. I. du Pont de Nemours & Co., Wilmington 98, Del.)

Check 1245 opposite last page.

#### Vinyl resin dry blend gives high production, top quality extrusion

Fabricators can now produce top quality products at high production rates by combining vinyl resin used as dry blend, with controlled-pressure extrusion — permitting operation at maximum screw speed of machine. Extrusion technique employs valve for controlling pressure continuously.

Previously, screen packs were used to increase pressure during extrusion. With vinyl pre-blends, however, screen packs tended to clog and cause a production stoppage. By using the valve, optimum pressure conditions can be established for each product, maintained continuously, and duplicated from day to day.

A valve of this type has been developed and is now on

## Mono Stearates Di

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Diglycol
Ethylene Glycol
Diethylene Glycol
Polyethylene Glycol
Propylene Glycol
Polyoxyethylene
Butoxyethyl
Glycerine



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CHEMICAL PROCESSING

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#### CHEMICAL MATERIALS

the market. Others are expected to be available shortly. In use, it is located between the dye and the extruder head. Pressure is easily adjusted by means of valve, used in connection with pressure gage and an immersion thermocouple.

Dry-blend resin, QYRS, is made by suspension process. It has bulk density of 30 to 35 lb/cu ft and high specific viscosity of 0.205 to 0.220 that results in improved physical properties. Narrow particle distribution in resin insures maximum extrusion rate, minimum dusting, and proper dispersion of plasticizer with resin.

Resin is particularly suitable for preblend formulations in building wire, flexible cord, appliance wire, telephone wire, power cable, and for contour extruded items such as garden hose, welting, and belting.

(QYRS is product of Bakelite Co., Div., of Union Carbide Corp., 260 Madison Ave., New York 16, N.Y.)

Check 1247 opposite last page.

#### Anionic surface actives

TIONS

SING

Technical data, applications of anionic surface-active agent for oil-soluble rust and corrosion inhibitors, and emulsifying, wetting, and dispersing agents, are contained in two-page bulletin. Bul 51 — Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa. Check 1248.

#### Clear, colorless films from acrylic emulsions

Uses: For formulating self-polishing floor finishes.

Features: Completely transparent films that remain permanently colorless are produced. Films do not have yellowish cast and do not darken and oxidize into insoluble material upon aging on floor. Although hard and water-spot resistant, films can be removed from floor with mild alkali cleaning solution.

Description: Of two emul-





### **NOW! IRRIGATION THAT'S TRULY PORTABLE**



### AND COSTS LESS! THANKS TO ENJAY BUTYL!

Flexible irrigation "pipe" and ditch liners fabricated from Enjay Butyl rubber are helping farmers and growers conserve water by assuring maximum irrigation from available water supplies . . . and at *lower cost!* Combining flexibility with strength and portability, the "pipe" allows irrigation of different areas with the same equipment in a one-man carry operation. Both "pipe" and ditch liners are impervious to weather and highly resistant to soil acids and bacteria. These systems are manufactured by the Carlisle Corp., Carlisle, Pa., and are distributed by Bono Products, Inc., Taft, Texas.

Enjay Butyl may well be able to cut costs and improve the performance of your product! Low-in-cost and immediately available, this truly wonder rubber has been put to profitable use in a wide variety of industrial and consumer products. For further information, and for expert technical assistance, contact the Enjay Company.



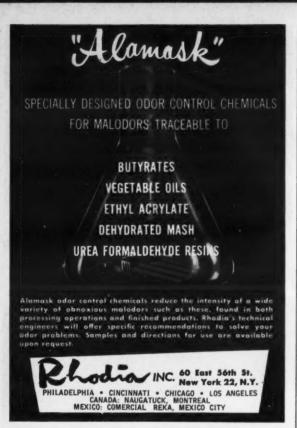
Pioneer in Petrochemicals

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y. Akron · Boston · Chicago · Detroit · Los Angeles · New Orleans · Tulsa

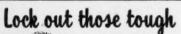


Enjay Butyl is the greatest rubber value in the world. It's the superdurable rubber with outstanding resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

Check 1249 opposite last page.



Check 1250 opposite last page.





LEAKS

Tacky and sticky
enough to hold on
to any surface.
Smooth and creamy
in texture . . . not
porous or grainy.
Sets up a springy
elastic seal that
seems "alive".



Leak Lock is a special purpose joint sealer designed to solve difficult leaking joint problems in all industries. It has been notably successful in the chemical, petroleum, atomic energy, electronic and refrigeration fields.

The plastic resin base stays elastic, thus eliminating the inefficient hard, crumbly texture found in ordinary sealing compounds. It is not affected by temperature or by vibration. Try it yourself. Highside Chemicals Incorporated. 16 Colfax Avenue, Clifton, N. J.

Send for FREE SAMPLE on your business letterhead



Check 1251 opposite last page.

#### CHEMICAL MATERIALS

sions, acrylic polymer Rhoplex B-74 is somewhat harder than Rhoplex D-70, which is modified acrylic copolymer. Rhoplex B-74 is sufficiently hard so that it does not form films readily at room temperature on non-porous substrates. It can be modified with polyethylene to reduce the minimum film-forming temperature and improve levelling properties, though gloss and hardness of film may be reduced somewhat.

Both acrylic emulsions are supplied in acid solution which is neutralized during formulation. Neutralizing agent may be alkali or an amine of virtually any cationic species, thus permitting considerable latitude in formulation.

(Rhoplex D-70 and Rhoplex B-74 are products of the Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.)

Check 1252 opposite last page.

#### Coal product chart

Chart, 16¼ x 11", contains complete family tree of products derived from coal. Coal products chart — Barrett Div., Allied Chemical & Dye Corp., Dept. CP, 40 Rector St., New York 6, N.Y. Check 1253.



"The sodium hydroxide saponifies the triglyceride."

Thanks to an idea by T. W. Kirby, Cities Service Refining Corp., Lake Charles, La. Artwork by Mrs. Kirby FOR BETTER, FASTER-SELLING FEEDS

Boost your FEED VALUES with amms

OXIDES and MINERAL FEED BLENDS

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- RED OXIDE
- MINERAL BLACK
- BROWN OXIDE
- YELLOW OXIDE

TAMMS INDUSTRIES, INC. 228 N. LA SALLE ST., CHICAGO 1, ILL.

Check 1254 opposite last page.

"KERODEX" protected hands wash clean without scrubbing.



"KERODEX" spreads on like a cream but acts like an invisible glove to shield the skin from the vast majority of industrial irritants such as acids, alkalis, solvents, paints, cutting oils, and resins. "KERODEX" does not smear. It does not affect materials handled, nor is it affected by them. Two types of "KERODEX" are available for "wet" and "dry" work. Write for full information on "KERODEX" barrier creams to Ayerst Laboratories, 22 East 40th Street, New York 16, N. Y.

Check 1255 opposite last page.

CHEMICAL PROCESSING

Detergent upgrades diesel lub

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Uses: D for lubricate low-temp, service, an service.

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#### Detergent-inhibitor upgrades auto, diesel lubricants

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Uses: Detergent-inhibitor for lubricants for use in both low-temp, stop-and-go auto service, and high-temp diesel service.

Features: Outstanding performance of material reportedly has not been equaled by conventional-type detergent-inhibitors or additives.

Description: Detergent-inhibitor contains sulfur, phosphorous, zinc and barium. It is reported to provide excellent protection against valve train wear and bearing corrosion at concentrations of 5.0 vol % or more. Lower concentrations may require addition of small amounts of auxiliary inhibitors for same protection. Additive packages containing material and necessary auxiliary inhibitors are tailored to meet specific requirements.

(Paranox 302 is available from Enjay Company, Inc., 15 W. 51st St., New York 19, N.Y.) Check 1256 opposite last page.

#### Zinc oxide advantages

Booklet of 24 pages, stresses quality, economic advantages, of zinc oxides which stem from unique surface treatment, unit-load method of shipment, and pelleting. "Protox Zinc Oxides and Rubber"—The New Jersey Zinc Co., Dept. CP, 160 Front St., New York 38, N.Y. Check 1257.

#### High-mw polysulfide yields strong bond to many surfaces

Uses: Material can be compounded to yield strong elastic bond to ceramics, metals, wood, plastics, and rubber.

Features: Polymer has greater hardness, modulus and tensile strength, along with good elongation. Resistance to heat aging is improved. Oils, solvents, mild acids, and alkalies resistance is excellent. Material also has good low temperature properties, moisture and gas impermeability,

## Have you tried MICRO-CEL®

- · to absorb liquids
- to provide bulk
- to prevent caking
- to control viscosity
- · to extend pigments
- to aid suspension
- to reduce surface sheen

## New Johns-Manville mineral filler can help you improve products and cut costs

Want to absorb liquids or control viscosity? Try Micro-Cel—it absorbs up to 6 times its weight in water, remains a free-flowing powder even after absorbing twice its weight in liquids.

Want to bulk up your compound for better control of package density? Try *Micro-Cel*—a cubic foot weighs as little as 5 pounds.

Want to prevent caking? Try Micro-Cel—its high absorption works wonders in controlling deliquescent products.

Want to extend pigments or reduce surface sheen? Try *Micro-Cel*—it combines fine particle size, large surface area and inertness with high absorption suggesting many applications.

Want to assure better suspension of heavy solids? Try *Micro-Cel*—its particle size, as low as .02 micron, provides uniform dispersion and blending.

Micro-Cel is a brand-new line of synthetic calcium silicates produced by combining lime with diatomaceous silica under carefully controlled conditions. Its unique combination of properties has already brought important benefits and savings to many processors.

Maybe you will be next. Just mail coupon

Maybe you will be next. Just mail coupon for further information, samples and technical assistance.



## Johns-Manville MICRO-CEL

SYNTHETIC CALCIUM SILICATES

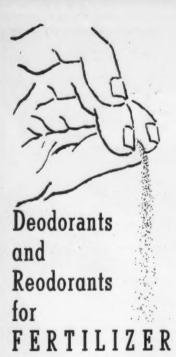
A PRODUCT OF THE CELITE DIVISION

The Powder That Flows Like a Liquid-Micro-Cel,

latest development of Johns-Manville Research, will

greatly improve the flowability of many products.

Check 1258 opposite last page.



Application of aromatics to commercial fertilizer, both organic and manufactured, is of increasing interest to producers. In the D&O Industrial Odorant Laboratories both masking and reodorizing compounds have been developed for soluble phosphate fertilizers, nitrogen-based products and organic materials such as dried blood, sewage sludge, animal manure, tankage, meat scraps, etc. Fertilizers can be rendered odorless - or a suitable scent, reminiscent of a farm environment, peat or humus can be added - at competitive costs. Write for specific details.

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Essential Oils
Aromatic Chemicals
Perfume Bases
Flavor Bases
Dry Soluble Seasonings

Check 1259 opposite last page.

#### CHEMICAL MATERIALS

excellent ozone and weathering resistance, and good dielectric characteristics.

Description: Liquid polymer is high molecular weight, liquid polysulfide polymer containing reactive thiol terminals which may be cured in-place at room temperatures to form solid rubbers.

Curing of liquid polymer is accomplished by converting thiol (-SH) terminals to disulfide (SS-) bonds, thus linking the short-chain segments together to form long-chain high polymer with elastomeric properties. Curing agents most widely used are oxygen-donating materials. (Liquid polymer LP-31 is product of Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton 7, N.Y.)

Check 1260 opposite last page.

#### Resin flow characteristic key factor in molding of larger parts

Excessive temp is unnecessary

Uses: For widespread applications in end products such as industrial parts, paper coating, film and sheeting, and housewares.

Features: Because of its unusually good flow characteristics, resin is of advantage in molding larger parts without excessive temperatures.

Description: Polyolefin resin combines high temperature resistance, dimensional stability, stiffness with toughness, and outstanding low-temp characteristics.

(Fortiflex A500 is product of Celanese Corp. of America, 180 Madison Ave., New York 16, N.Y.)

Check 1261 opposite last page.

#### Lithium booklet

Properties, uses, research potentials, and availablity of lithium and its compounds are discussed in 15-page tabbed booklet. "Presenting Lithium" — American Lithium Institute, Inc., Dept. CP, PO Box 549, Princeton, N.J.

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It will be sent to you without charge or obligation . . .

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CHEMICAL PROCESSING

## VERSATILE POLYMER PVP

#### HERE ARE SOME OF THE AREAS IN WHICH PVP IS IMPROVING PRODUCTS AND PROCESSES

Detergents: Prevents soil redeposition, controls color bleeding, and reduces irritation.

Lithography: Colloid for diazo and dichromate sensitizers. Excellent post-etch. In fountain solution, helps keep cloth rollers clean.

Paints: Improves pigment dispersion and film leveling. Makes possible use of dyes to obtain new colors and shades.

Waxes and Polishes: Improves luster, cleansing action, flow, and wetting.

Cosmetics: In hair preparations, PVP improves hair management. Acts as a detoxifier. Stabilizes lathers in shaving preparations and emulsions in skin cleansing products.

Pharmaceuticals: Minimizes toxic side effects of many drugs. Prolongs drug action and increases effective blood level. Acts as suspending agent in liquids and binder in tablets.

Beverages: Removes chill haze and acts as a clarifying agent by complexing with and precipitating tannins in beer, wines and fruit juices.

Adhesives: Gives stable dispersions of vinyl adhesives and superior adhesion.

Paper: Produces better pigment dispersions, smoother coatings. Improves wet strength and ink receptivity. Inks: Better gloss and pigment dispersion. Increases solubility of dyestuffs and prevents gelation. Can improve ball-point inks, typewriter ribbons and carbon papers.

Textiles: Prevents flocculation of titanium dioxide in delustering of synthetic fibers. Adaptable as warp size for acetate and viscose. Improves other sizes. Improves dye receptivity of hydrophobic fibers. Dye scavenger in print washes.

Glass: Gives outstanding adhesion to glass surfaces. Acts as a glass fiber forming size for increased strand strength.

more information on product at right, specify 1263 see information request blank opposite last page.

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ACETYLENE CHEMICALS DEPARTMENT

ANTARA CHEMICALS

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GENERAL ANILINE & FILM CORPORATION

IDEAS: from other industries and nuclear field . . . new trends in research, processes, services



Typical three-stage

When a cat cracker was placed in operation at Premier Oil and Refining, flue gas vent from catalyst regenerator set up a mighty roar . . . until plant installed a snubber which . . .

## reduces noise level 90 to 95%

GORDON WEYERMULLER
Associate Editor

Problem: Residents in the vicinity of Premier Oil & Refining Co., Fort Worth, Texas, did not welcome the deafening, continuous roar of a cat cracker placed in operation a little over a year ago. Cause of the noise was flue gas being vented from the catalyst regenerator.

Neighbors made their displeasure known in no uncertain terms. Faced with this public relations problem, the refinery sought a method of reducing the noise.

Solution: Installation was surveyed and a flue gas snubber was recommended for the regenerator gas vent exhaust stack.

Snubber consists of a number of multiple chambers, each of which contains perforated tubes. Unit is designed to reduce the velocity, noise, and pulsing sound of the exhaust gas. It is the shock of this confined air at high pressure and velocity as it expands in the open air that sets up sound waves of objectionable intensity. Snubber harnesses this continuous slug of high-pressure gas, slows down its velocity, and permits expansion at a gradual rate.

Snubbers are available in either two-stage or three-stage design. Each unit is engineered to specific requirements of installation.

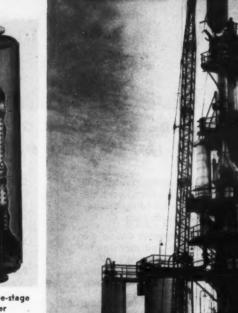
Installation of the snubber presented some difficulties. Snubber is 6' in diameter and 22' long, built with 5%" steel outer shell and 3%" steel interior tubing. It weighs more than 16,000 pounds. In order to carry this added weight without undesirable stress, regenerator gas vent stack was counterbalanced before snubber was installed. Two cranes were used to hoist snubber into position at top of tower.

Results: Snubber has reduced

roar of cat cracker to a whisper. Complaints from neighbors have been eliminated. Before installation of the snubber, noise level readings taken in the adjacent plant area showed an average reading of 94 decibels. After installation, readings taken at identical locations showed an average reading of 78 decibels, equaling level of background noise. This reduction of about 20 decibels represents removal of about 90 to 95% of the noise.

(Snubber is product of Burgess-Manning Co., 749 E. Park Ave., Libertyville, Ill.)

Check 1264 opposite last page.



Snubber being installed on catalyst regenerator at Premier Oil

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## Titanium tetrachloride with higher purity at less cost

Temperatures are much lower than conventional method

Development of a way to make titanium tetrachloride at lower temperatures, with higher purity, and at less cost, marks the first change in production of this compound in over one hundred years. Process opens new avenues for use of low grade ores, such as imenite.

Briefly, process works this way: Ilmenite, rutile, or a titanium-rich slag is crushed, ground, and treated with concentrated sulfuric acid. The iron content of this solution is reduced by two controlled crystallization steps.

Remaining solution, containing predominantly titanium, is treated with hydrogen chloride and solid potassium chloride. Upon further cooling, potassium chlorotitanate precipitates out. The complex salt of titanium is decomposed, yielding pure titanium tetrachloride after the first condensation of the liquid.

While it will take some time

to develop this process fully, it is expected that it eventually will replace the high temperature process now in use. (Information courtesy of Armour Research Foundation, Illinois Institute of Technology, Dept. CP, 35 W. 33rd St., Chicago 16, Ill.)

#### 'Camera-on-a-fishpole' photographs inside tank for radioactive wastes

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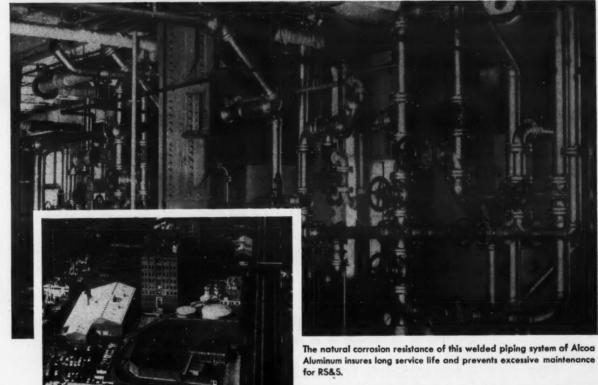
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Examines "hot" tank after waste removal

Device consisting of camera mounted on metal pole permits routine examination of inside of radioactive waste storage tank at Hanford atomic plant after wastes are removed. In order to photograph inside of tank which had only 9" diam opening, an old copy camera was adapted for 2¼" x 3¾" roll film and installed Turn to page 115

## Low cost, corrosion-resistant piping



Aerial view shows section of Yonkers plant of Refined Syrups & Sugars, Inc. where a \$5-million expansion and improvement program is now underway.

## ALCOA Aluminum Pipe prevents product contamination for Refined Syrups & Sugars

Part of a continuing program of process improvement is the new ion-exchange system now producing highest purity Flo-Sweet liquid sugar for Refined Syrups & Sugars, Inc., Yonkers, N.Y. RS&S set this prime requirement for piping in the system: it must be highly resistant to corrosion . . . to prevent contamination of the syrup. They specified piping of ALCOA® Aluminum.

The natural corrosion resistance of aluminum insures high purity and low color level for the liquid sugar. Aluminum will not react chemically with the fluids in the process, and its low friction factor insures fast flow without high pumping costs... even with sluggish syrups. Furthermore, initial cost of aluminum pipe is far less than that of other corrosion resistant materials (e.g. schedule 40 aluminum pipe is about 1/7th the cost of schedule 40 stainless).

Like Refined Syrups & Sugars, you, too, will find that piping of Alcoa Aluminum is often the surest, most economical way to eliminate corrosion and prevent product contamination. Find out how you can put Alcoa Aluminum Pipe to work profitably in your process. Call the nearby Alcoa sales office listed in your classified directory . . . or mail the convenient coupon today!

Aluminum Company of	America
902-K Alcoa Building,	Pittsburgh 19, Pa.
Please send me your FRI	EE BOOKLET, Alcoa Aluminum Pipe and Fittings
I am interested in pipir for the following proce	
Name	
Company	Title
Address	9
Address	





Check 1265 opposite last page.

## Experienced...



## Titanium Fabrication

for the processing industries

TITANIUM—the upcoming metal of the times for corrosion-resistance—requires, experienced skill for fabrication into precision equipment for the processing industries. Struthers Wells has gained that experience from the inception of commercial quantities of the metal. The several pieces of equipment shown are typical of the precision equipment built by SW with this new strategic metal. When the corrosion-resistance of TITANIUM fits your need—see Struthers Wells for your equipment.

### STRUTHERS WELLS Corporation

Struthers Wells

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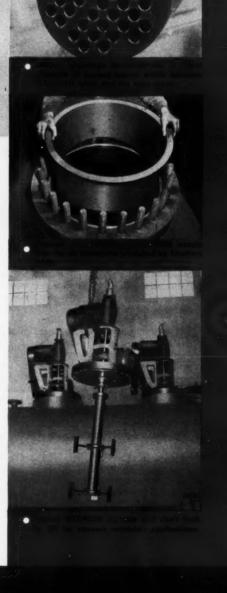
#### STRUTHERS WELLS PRODUCTS

PROCESSING EQUIPMENT DIVISION — Crystallizers ... Direct Fired Heaters ... Evaporators ... Heat Exchangers ... Mixing and Blending Units ... Quick Opening Doors ... Special Carbon and Alloy Processing Vessels ... Synihesis Converters

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and Back-up Rolls

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Machines . . Roller Table and Tumble Die Bending
Machines . . Press Brakes . Punching and Notching
Machines . Forming Dies



For more information on product at left, specify 1266 see information request blank opposite last page.

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Solution was ins

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Starts on page 113



Technicians prepare to lower "camera-on-a-fishpole" into radioactive waste storage tank

at end of 12' pole.

Flash reflector was fitted with spring hinge so that it could be folded back during insertion and spring back into place once inside tank. Solenoid and flashgun apparatus for firing bulbs and tripping camera shutter were strapped up the pole from the camera.

Farther up on pole a circular metal shield, calibrated to help make sure camera was rotated full 360° inside tank during picture taking, served as radiation shield. An arming lever was fitted on camera to enable photographers to reset shutter without removing plastic covering over camera. (Information courtesy of General Electric Company, Dept. CP, Schenectady 5, N. Y.)

## Handling problem solved with anti-skid coating at brewery

Coated cases no longer slip from pallets

Problem: Switching to an all-over gloss inked shipping case meant a more attractive package for Liebmann Breweries in Brooklyn, but it also brought a handling problem along with it. The slick finished cases were hard to handle, kept slipping from pallet loads during stacking and truck shipment.

Liebmann felt a load locking adhesive was not warranted, but also felt something should be done about this nuisance.

Solution: A spraying system was installed whereby cases



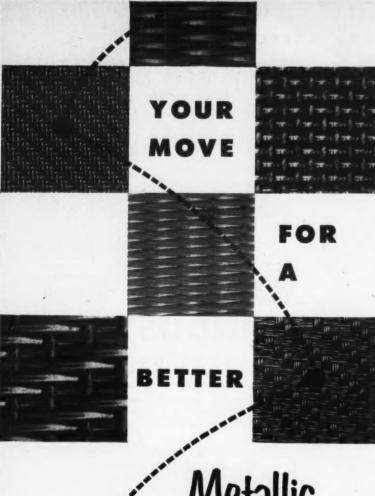
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## Metallic Filter Cloth

NEWARK for ACCURACY For the most uniform, most accurate metallic filter cloth, specify NEWARK. All weaves, all metals for all types of service, there's a NEWARK filter cloth engineered to meet your requirements. Send for our New Catalog E.



351 Verona Avenue • Newark 4, New Jersey

Check 1268 opposite last page.

are coated with an off-white resin dispersion which dries to a colorless skid-resistant film. Spray gun is mounted on bracket over delivery end



Cases are coated with an offwhite dispersion which dries to a colorless skid-resistant film

of case sealer compression units. Case itself trips switch to start and stop spray, which is applied to top of case only. Drying is nearly instantaneous.

Results: Slippage problem has been entirely eliminated. Coating in no way mars or alters appearance of the glossy finish.

(Resyn 32-4150 non-skid coating is made by National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.)

Check 1269 opposite last page.

(Spray gun was supplied by DeVilbiss Co., 296 Phillips Ave., Toledo 1, O.)

Check 1270 opposite last page.

#### FOR MORE

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service slip opposite last page of this issue. Fill in slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.



If you have steam available and need a source of inexpensive process vacuum, use Worthington steam-jet ejectors. The advantages of Worthington ejectors are:

- · Low initial cost
- Low installation cost
- Low maintenance cost
- No moving parts
- Installation flexibility
- No sealing liquid required
- Easy operation
- Available in any machinable material
- · Handles both wet or dry gases
- Handles large volumes
- Complete line. For information about single- and multi-stage ejectors get in touch with your nearest Worthington District Office. Or write to Section S-71, Worthington Corporation, Harrison, N. J.

### WORTHINGTON

Check 1271 opposite last page.

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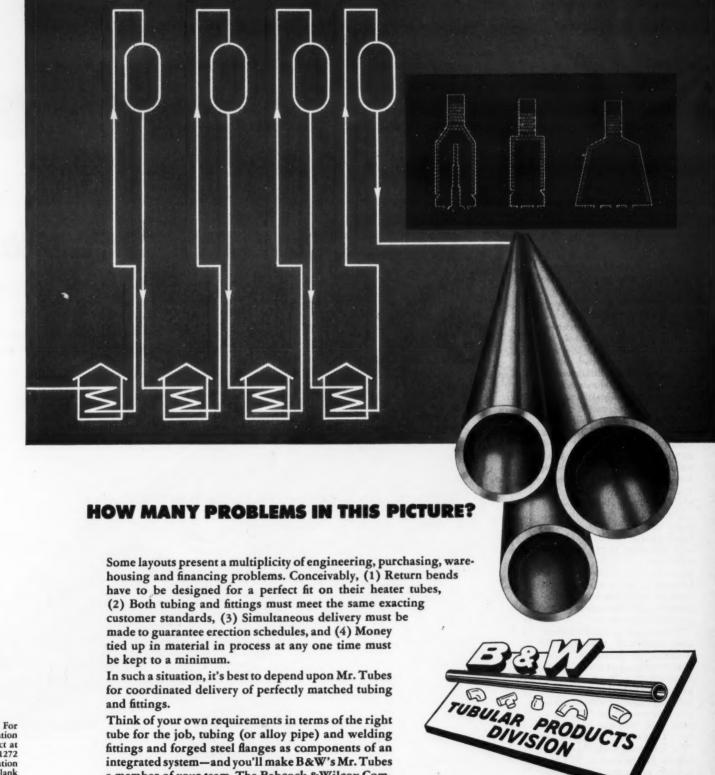
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more information on product at right, specify 1272 see information request blank opposite last page.



Seamless and welded tubular products, seamless welding fittings and forged steel flanges in carbon, alloy and stainless steels

fittings and forged steel flanges as components of an

integrated system—and you'll make B&W's Mr. Tubes

a member of your team. The Babcock & Wilcox Com-

pany, Tubular Products Division, Beaver Falls, Pa.

TA-6085-PP-1

#### Classification system for carbohydrates

Uses code numbers to define structure, configuration

Numerical classification system has been developed by National Bureau of Standards for identifying carbohydrates. System uses code numbers to define substance's structure and configuration.

For classification of simple carbohydrates, a primary code number of six or seven digits is used. Decimal point is inserted after second digit to separate figures that provide broad generic classification from those that show definite structure. Additional digits are sometimes required for more complex structures.

#### Meaning of Numbers

First digit divides carbohydrates into groups of increasing complexity. For example, "1" indicates monosaccharide; "2" disaccharide, etc. Second digit shows substitution on the polyol structure.

When half or more of hydroxyls are free, classification number is "0." When more than half are substituted, number corresponds to the substituent present in predominating amount. If two classifications are possible, the one with lower number is used.

First digit to right of decimal point defines the skeleton of fundamental carbon chain; and the next digit, the configuration of main structural unit. No distinction is made between p and p modifications because enantiomorphic substances give like-infrared absorption spectra.

Third digit to right of decimal represents characteristic structure of substance. Products containing anomeric forms in equilibrium, such as amorphous sugars and materials not subject to specific classification, are represented by "0"; pyranose and furanose structures by "1" to "6"; glycitols by "7"; open-chain aldehyde and ketone derivatives by "8"; and aldonic acids by "9", regardless of whether they are present as acid, salt, ester, amide, or lactone.

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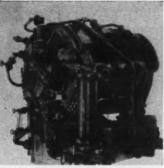
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CHEMICAL PROCESSING

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(Above left) Over 95% of the steam-propelled U. S. Navy ships were fitted with Griscom-Russell heat transfer equipment during World War II. Illustrated above is a low-pressure, 2-stage, flash type distilling plant with a capacity of 12,000 gallons per day for distilling fresh water from sea water. Sheets, plates, tubes, and shells are of Revere Cupro-Nickel. (Above right) Popular on Tankers and Cargo Boats—This is a low-pressure, submerged tube, package type distilling plant made by GRISCOM-RUSSELL to produce L2,000 gals. per day of fresh water from sea water. Sheets, plates and tubes are of Revere Cupro-Nickel.

## Sheets, Plates and Tubes

... in its shipboard distillation plants because they withstand the most rugged, corrosive, sea water service

GRISCOM-RUSSELL designs and manufactures modern, low-pressure, submerged tube and flash type distilling plants for land and sea service. Capacities range from 4,000 to 500,000 or more gals. per day. Their total installed capacity of distillation equipment, to date, exceeds 50,000,000 gals. of water.

Included in this are distillation plants aboard cargo ships, vessels of the U. S. Navy, and such luxury liners as the S.S. United States, which distills all the water used aboard with Griscom-Russell equipment.

Playing a mighty important part in most of the Griscom-Russell distilling plants are Revere Cupro-Nickel Sheets, Plates and Tubes. In many cases Revere Cupro-Nickel plates have replaced the castings formerly used for the shells. The main reason for using this Revere Alloy is because of the way it resists highly corrosive sea water. Less hardy metals would have to be frequently replaced. So frequently, in fact, as to be uneconomical. They might cost less at the outset, but would prove a mighty expensive investment in the long run. So, for a little extra cost, Griscom-Russell can assure customers that their equipment will provide longer trouble-free performance in the toughest kind of service.

This is still another example of higher initial material cost resulting in more reliable performance, fewer shutdowns and lower operating costs. Also, it is another example of how Revere's wide experience in the condenser tube field, and the tremendous amount of research and laboratory work done in determining the relative corrosion resistance of the different alloys under a wide variety of operating conditions, can prove most valuable.

Since there are variable factors in practically every condenser tube installation, why not take advantage of this storehouse of facts and consult with Revere's Technical Advisory Service before making your tube commitments?

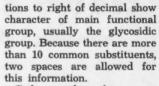
#### REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801 230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford. Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calboun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.



Check 1273 opposite last page.



Code number for ∝-D-glucopyranose is "10.2110." Reading from left to right, "1" shows that substance is a monosaccharide; "0," that hydroxyl groups are predominantly unsubstituted; "2," that it has primary 6-carbon structure; "1," that it has glucose configuration; "1," that it has Cl pyranose ring with an axial glycosidic group; and "0," that glycosidic hydroxyl is not substituted.

System was worked out in connection with program sponsored by Office of Naval Research for investigation of structure, configuration, and ring conformation of the sugars and their derivatives by infrared absorption measurements.

Although devised primarily for comparing infrared spectra, system can be used for classifying structurally related carbohydrates for variety of purposes. It should be useful to research workers who need to assemble lists of structurally related compounds for any reason.

(Further details on system for classification of structurally related carbohydrates may be obtained from National Bureau of Standards, US Department of Commerce, Washington 25, D.C.)





#### How to keep a

### clean screen

when sizing sticky materials



LINK-BELT ALONE heats screens with a "series" arrangement requiring fewer cables, lower initial cost...providing less power loss, more even heating. Above, each of five "UP" screen cloths is connected to 12-kva transformer.

#### Electrically-heated cloth enables LINK-BELT "UP" vibrating screen to deliver its full capacity

Here's a screen delivering high-velocity action that's unsurpassed for fast, accurate sizing. And to guard that efficiency against blinding by sticky or hygroscopic fines, Link-Belt offers a superior electric screen-heating arrangement. Among its advantages: GREATER OUTPUT. Open mesh may boost capacity as much as 50%. Downtime for cloth cleaning and replacement is eliminated.

BETTER, MORE UNIFORM PROD-UCT. Clear cloth provides more accurate sizing.

LONGER CLOTH LIFE. No whipping due to material accumulation.

LABOR SAVINGS. Ends mechanical cleaning.

Write for Book 2377-A—full data on "UP" screens. Your Link-Belt office has facts on the heating feature.





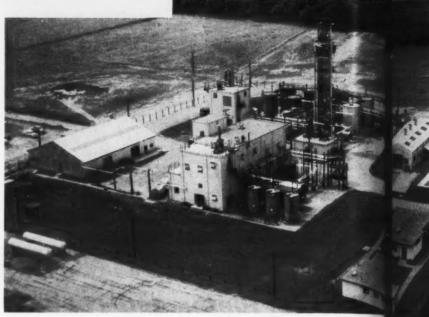
**VIBRATING SCREENS** 

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs.

Representatives Throughout the World.

Check 1274 opposite last page.





In a search to add more commercially useful products to the present list of coal tar chemicals, Koppers' new development plant . . .

## investigates higher-boiling coal-tar chemicals

Development work to investigate higher-boiling coal-tar chemicals is being conducted at Koppers' new plant in Arroyo, W. Va. Plans are to produce sufficient quantities of these chemicals for market exploration and development.

Up to now, only a dozen or so of the more than 300 compounds definitely identified in coal tar have found commercial use. Generally, these chemicals have been restricted to those distilling at temperatures to 500°F. Koppers expects to add more commercially useful products to this list by devoting activities to those distilling in the 500-700°F range.

Basically, operations employed are distillation and crystallization. Crystallizers separate high boiling compounds previously processed in the fractionating columns. At same time, electrical pipeline heating systems are being studied to determine best method for handling the high melting compounds.

Raw material is from Tar Products Division plant in Follansbee, W. Va. Initially, plant will utilize creosote. Attention presently is given to separation of phenanthrene, anthracene, and carbazole, which are the largest fractions contained in creosote.

Interesting aspect of this work is fact that creosote is upgraded by removal of these fractions. PAC chemicals add nothing to physical properties of creosote. In fact, their tendency to crystallize under certain conditions proves troublesome in certain pressure treating and handling operations.

Optimism over success of project is emphasized by fact that Koppers purchased 285 acres to house the present four-acre plant. Crystallization and distillation units have been designed to serve as nucleus for future expansion.

Also included in the four-acre plant are manufacturing facilities for producing 500,000 lb per year of niacin (nicotinic acid) from quinoline. Both animal feed and USP grades are produced.

Strict control over flow of quinoline and other reactants in this "continuous" batch process is maintained through use of metering pumps. Equipment and piping is either stainless steel or glass, since highly corrosive sulfonating and oxidizing agents are used in the process.

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Koppers Company purchased 285 acres near Arroyo, W. Va., to house this four-acre plant producing niacin and doing development work on higher boiling coal-tar chemicals



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Control and recording panel is used in study of electric pipeline heating systems to handle coal-tar chemicals in the 500-700°F distilling range

High purity process water, also required in process, is obtained in an ion-exchange purifying system.

Packaging operation, during which niacin is exposed to air for first time, is conducted under controlled conditions of atmospheric pressure, temperature, and humidity. This is necessary to maintain purity and potency of product.

(More information about niacin may be obtained from Tar Products Div., Koppers Company, Inc., Pittsburgh 19, Pa.) Check 1275 opposite last page.

#### Crane valves cut costs on corrosive services at Crosby



### Xylene with dilute hydrochloric acid is routine for these valves

This case history may point the way to reducing valve repairs and replacements in your own plant.

At the Picayune, Miss., plant of Crosby Chemicals, Inc., these Crane 18-8 SMo stainless steel plug gate valves are already in their second year on highly corrosive xylene and dilute hydrochloric acid solution. Valve operation is 6 or 8 times a day. Despite the extremely corrosive fluid these 2-inch No. 18851 Crane valves are handling, there has been no deterioration in their performance.

Here are some reasons why these valves are so trouble-free: Crane plug gate valves have seats cast integral and precision machined to match the plug disc. Straight-through ports permit unrestricted flow; yet, the plug disc construction permits control throttling. Features like these make Crane plug gate valves ideal for many corrosive services—low cost to maintain, dependable for steady production.

Quality performance is routine with Crane valves, because quality methods are routine in their production.



Ask your Crane Representative for a copy of folder AD-2080, describing Crane stainless steel valves.

### CRANE VALVES & FITTINGS

PIPE . PLUMBING . KITCHENS . HEATING . AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers Serving All Areas

Check 1276 opposite last page.



For over 27 years, Airetool Manufacturing Company has pioneered in the research,

design, development and manufacture of tools and airpowered motors for use in constructing and maintaining all types of tubular equipment. Today, many Airetool developments are accepted as "standard" methods by those in the tubular construction and maintenance industries.

As refineries and industries grow larger and more complex, tube maintenance problems increase. Airetool designers and engineers combine modern research and planning methods with quality materials and precision construction so that today's maintenance problems need not be handled by yesterday's methods.

AIRETOOL tube construction and maintenance equipment is your assurance of outstanding dependability and performance.



TUBE CLEANERS.— Rugged, fast cutting, easily remove hard scale and deposits. Air driven motors in wide range of sizes and speeds. P-type cleaner head illustrated, many others available.



CONDENSER CLEANERS — Powerful, fast, and dependable. Air driven motors muffled for quiet operation. Built-in flushing system keeps cleaner heads cool, removes cuttings.

AUTOMATIC TUBE EXPANSION CONTROL SYSTEM — Accurately rolls tube joints to correct, preset tightness. The "standard" for efficient tube rolling.



These are just a few of the many Airetool products available for your use. Remember . . . there's an AIRETOOL tube cleaner and tube expander for every type of tubular construction. Write for free, illustrated literature. Ask for Bulletin No. 60.

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge REFRESENTATIVES: in principal cities of U. S., Canada, Mexico, South America, England. Europe, Puerto Rico, Italy, Japan, Hawaii Europe Rough Rico, Italy, Japan, Hawaii Plant: Vilaardingen, The Netherlands CANADIAN PLANT: Branford, Ontario

Check 1277 opposite last page.



Check 1278 opposite last page.

IDEAS

#### Glass brick shielding is as dense as iron, 2/3 dense as lead

Designed for use as transparent radiation shielding, lead glass brick can be inserted into metallic or concrete wall to enable worken to perform remote manipulations, read instruments, or observe nuclear operations being performed behind wall shield



Glass shielding brick provides peephole for atomic processes and experiments

As dense as iron and 2/3 as dense as lead, brick is cast in three sizes, including large 8 x 8 x 4" square block. Composed of special lead glass mixture, bricks are mounted in steel frame for protection and handling.

(Glass shielding brick is product of The Atomic Center, Dept. CP, 489 Fifth Ave., New York 17, N. Y. Check 1279 opposite last page.)

#### Merger problems?

Explanation on how to solve complete problems arising from integration and control of corporate acquisitions and mergers can be found in 67-page report. Practical reports of company experience cover financial management, production, marketing, and personnel integration. To obtain Financial Management Series 113, remit \$1.75 (AMA members \$1.00) direct to American Management Assn., 1515 Broadway, New York 36, N.Y.

For more infomation on product at right, specify 1280 . . . see information request blank opposite last page.

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#### Where Trufin is **Most Effective**

The use of Wolverine Trufin is most effective in heat transfer applications where outside heat transfer coefficients are low when compared with inside coefficient values - such as those described below.

AIR HEATING OR COOLING where the air is outside the tube and circulating water or condensing steam is inside.

REFRIGERANT AND OTHER HYDRO-CARBON CONDENSING where the refrigerant is outside and circulating

OIL COOLING OR HEATING where the oil is outside and steam or water inside. In all such cases the added outside heat transfer surface gained through the use of integrally finned Wolverine Trufin can reduce the size and cost of the heat exchanger and yield real savings.

#### Can use Trufin in New and Old Units

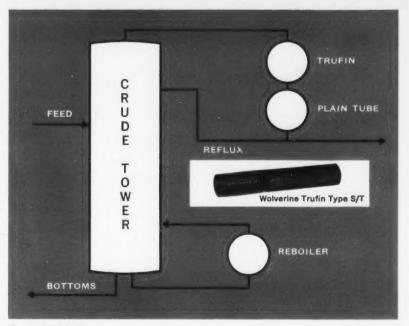
With the passing of each day Wolverine Trufin Type S/T is finding ever increasing acceptance in the chemical, petro-chemical and petroleum-refining fields . . . for use in retubing existing equipment and in the design of new

Retubing an existing heat exchanger can be accomplished, in many instances, simply by directly substituting Trufin Type S/T for plain tube. Because its integral fins give it greater outside surface area Trufin packs more heat transfer surface into a given space -steps up the capacity of existing

When designing new equipment Trufin Type S/T permits the design of smaller, more efficient units with a direct saving in materials, time and labor. Trufin Type S/T is widely used in gasoline condensing, butylene condensing and lube oil cooling-is particularly effective in handling light hydrocarbons.

#### NEW BOOK-FREE

Actual cost breakdowns showing the cost of Wolverine Trufin in actual comparison to prime surface tube are available in Wolverine's brand new book-"Comparative Heat Exchanger Costs". Write for your copy.



**Crude Unit:** 

#### HEAT DUTY AND ON STREAM TIME BOTH UP WHEN TRUFIN S/T USED

By Ernest Dodd

Met an engineer the other day who accused us of being prejudiced about Wolverine Trufin® Type S/T—the integrally finned condenser tube. Actually we had no defense-how could we feel any other way about a product that performs like Trufin.

Consider, for example, the experience of engineers in a large Eastern refinery when they used Trufin Type S/T in one of two overhead condensers on their crude tower. This unit was placed on stream in March, 1956 and 14 months later was shut down for turn-around.

The application consisted of two units in series-the top one tubed with Wolverine Trufin Type S/T and the lower one with prime surface condenser tube. Upon inspection of the two bundles it was discovered that although the finned tube unit was fouled on the shell side due to the relatively sour crude, the fouling followed the exact contour of the fins. No fins were occluded and the bundle appeared in extremely good condition. This fouling matter was extremely soft and could be cleaned

simply by turning a hose on it and -washing it out.

However, actual comparison proved that the lower bundle-which was tubed with plain tube-was in very poor shape. The shell side fouling was an extremely tough scale formation which required scraping in order to clean it up. The tube side of this bundle was in approximately the same condition as the finned tube unit.

During the 14 months of operation the engineers at this refinery estimated that they realized a minimum increase in heat duty of 40%. It was also the first time that their crude tower had been operated for a full year-without shutting down to clean the condensers.

Where Wolverine Trufin Type S/T is concerned you just bet that we're prejudiced-and we're proud of it, too. Next time you have a unit off stream for retubing why not look into the economies of Trufin Type S/T . . . and prove for yourself how this integrally finned condenser tube can boost performance while saving you time and

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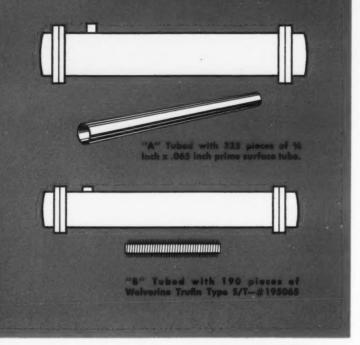
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#### HERE'S HOW TO GET MORE BTU'S PER \$\$\$





Take a look at the sketches of the two shell and tube condensers shown on this page. One is substantially larger than the other—but both handle the same heat load.

That's important because it represents vital savings in metal—both in the size of the condenser shell and in the number of tubes required. It also means additional savings in heat exchanger maintenance—because there are 135 fewer tubes to clean or replace.

Assuming that Condenser "A" is a fourpass unit and Condenser "B" a twopass unit, it is interesting to note that "B" (tubed with Trufin Type S/T) has the least tube side pressure drop.

With all factors such as alloys, water conditions, temperatures and unit design taken into consideration the use of Trufin Type S/T—with an increase in tube side velocity—can give a greater boost in heat transfer capacities. This provides the equivalent of additional equipment without additional cost—adds up to more BTU's per \$\$\$.

Next time you are considering condenser tube—for new equipment or old —remember Wolverine Trufin and the savings it makes possible. For more complete information write for your copy of the Wolverine Trufin Catalog.

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Wolverine Trufin is available in Canada through the Unifin Tube Company, London, Ontario

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Snap-Tite coupling in disconnected position, valve closed

Here is a specially designed Snap-Tite quick-connect, quick-disconnect coupling, ideal for use in missile-fueling systems. This unit is specifically designed to be manual-connected . . . can also be disconnected manually, or by use of an air-actuated remote control.

#### NOT A DROP SPILLED!

When the coupling is disconnected, it spills only that small amount of fluid which clings to the metal. The valves in both the coupler and nipple automatically shut off when disconnected, with no leakage.

#### NO AIR INCLUSION!

Coupling operation encloses only a minute amount of air.

#### MINIMUM PRESSURE DROP!

Smooth, streamlined passages assure maximum flow.

Variations of this coupling, to meet your required specifications, can be furnished with the appropriate seals to handle liquified gasses, exotic fuels, and a large variety of fluids with working pressures up to 3,000 PSI and temperatures from —300°F to +400°F. Units have been designed up to and including 5" size.

#### STANDARD COUPLINGS, TOO!

Your coupling needs might not be as critical as the coupling shown here, but you can be sure, when buying standard Snap-Tite couplings, that the same outstanding engineering and manufacturing skills are basic throughout the Snap-Tite line. Write for complete catalog... or describe your specific coupling problems. Snap-Tite, Inc., Union City 6, Pa.



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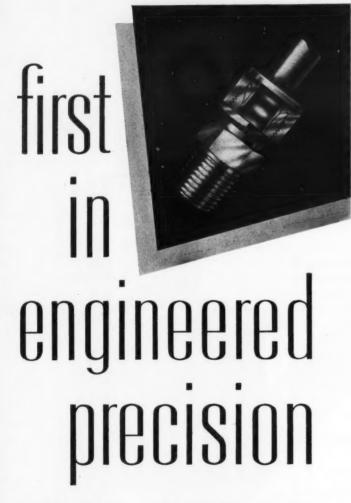
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## Swage

TUBE FITTINGS



 Swagelok tube fittings provide an easilyinstalled, torque-free, leak-proof seal. There is a Swagelok Specialist in your area. Write Dept. (7

CRAWFORD FITTING COMPANY 884 East 140th Street . Cleveland 10, Ohio

Check 1302 opposite last page.

IDEAS

#### **Decision-making** course offered for executives

To be conducted at AMA's new 90-acre academy

A course for investigation of and practice in the decisionmaking function will be one of the initial activities of the AMA's new acadamy of Advanced Management. The twoweek Executive Decisionmaking course will be conducted at the 90-acre site at Saranac Lake, New York.

The course is patterned after the highly popular business "war" game conducted earlier this year by AMA (see CHEMICAL PROCESSING, July 1957, pages 147-148).

More than 125 executives are expected to take part in the course which will be offered four times this year. Dates are Oct. 7 to 18, Oct. 28 to Nov. 8, Nov. 11 to 22, and Dec. 2 to 13. Enrollment will be limited to 45 operating and staff executives at top and middle levels of management responsibility.

Tuition fee is \$1000 - which includes tuition, materials, food, lodging, transportation to and from local airports and train stations, and one year membership in AMA.

(Detailed information on Executive Decision-making Course can be obtained from American Management Association, 1515 Broadway, Times Square, New York 36, N. Y.)



"Aren't you plugged in yet?"

#### New uses found for **Metallic Oxide Pigments**

Today new product planners and preduction engineers are finding uses for the unique physical and chemical prop. erties of metallic oxides which are surprisingly far afield from traditional usages.

Below is a review of their character. istics. Look them over. You may get the germ of an idea which will lead to the improvement of existing products ... or to the reduction of new product manufacturing costs.

We'll be glad to cooperate with you in exploring the possibilities. Address Dept. 75, C. K. Williams & Co., Easton,

Name	Properties		
Pure Red Iron Oxides and Kroma Reds	Fe <sub>2</sub> O <sub>3</sub> -98.5% SpG5.15 Color—Salmon to purplish red		
Pure Yellow Iron Ox- ides	Fe <sub>2</sub> O <sub>3</sub> .H <sub>2</sub> O-99% SpG-4.03 Color—Lemon to dark orange		
Pure Black Iron Oxides	, Fe <sub>3</sub> O <sub>4</sub> -96% min. SpG4.96 Color—Blue Black		
Pure Chromium Ox- ides (and Hydrates)	Cr <sub>2</sub> O <sub>3</sub> -99% SpG5.20 Color—Light to dark green		
Natural Oxides—Ochers, Umbers, Siennas, Metallic Browns, Red Oxides	Wide range of ferric oxide content and red, yellow and brown colon		
Venetian Reds	Fe <sub>2</sub> O <sub>3</sub> -40% SpG,-3.45 Color—Light to med. red		
Cuprous Oxide	Cu2O-97% min.		
Extenders—Barytes, Calcium Carbonate, Calcium Sulfate, Silica	Wide range		

#### Characteristics

Composition: The basic colors of the iron and dramium axides are determined by chemical composition. Reds are ferric oxide (Fe2O3, H2O); blacks, ferro-termined ferric oxide (Fe2O3, H2O); blacks, ferro-termined ferroscopie (Fe2O3, H2O); blacks, ferro-termined ferroscopie (Fe2O3); and greens, chromic oxide (Fe2O3); and greens, chro oxide (Fe<sub>3</sub>O<sub>4</sub>); a All these compo light permanent.

Particle Shape: Physical properties such as oil absorption and suspension characteristics are dependent on particle shape, controlled by manufacturing

Size: Color range is controlled by particle size-average size increases as color darkens. Uniformity of size determines brightness.

Purity: Freedom from impurities is essential for su-perior pigment properties and to prevent dele-terious effects in end-products. Control of salubin salts, manganese and copper content are an im-portant part of the Williams manufacturing



East St. Louis, III. Easton, Penna. • Emeryville, Calif.

Check 1304 opposite last page.

CHEMICAL PROCESSING

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#### IMS clinic will feature management techniques of industrial engineering

Problems facing three major areas of industrial engineering's management phase will be discussed in one-day conference to be featured at 21st Annual Time and Motion Study and Management Clinic of Industrial Management Society. Clinic is scheduled for Oct 30 — Nov 1, 1957 at Hotel Sherman in Chicago.

In addition to the one-day conference, leading experts from industry, labor, and education will discuss latest trends in time study, work simplification, incentives, methods, production control, operations research, and plant layout. Winning films in annual Methods Improvement Contest will be shown.

(Information courtesy of Industrial Management Society, 330 S. Wells St., Chicago 6, Illinois.)

#### 'White-collar' morale

Booklet of 64 pages sets forth sound practices for building better relations with all categories of salaried employees. To obtain "Satisfying the Salaried Employee", remit 50c direct to National Association of Manufacturers, 2 E. 48th St., New York 17, N.Y.

#### FOR MORE INFORMATION

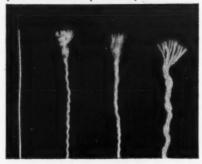
Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

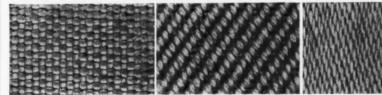
## Test your FILTER FABRIC KNOWLEDGE here!

1. Yarns are the basis of fabric construction. Yarns shown here are plied, spun single, monofilament, multifilament. Can you match them up correctly?



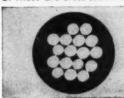
Processing engineers have to know many things, but they don't necessarily have to be filter fabric experts. Not when they can rely on Wellington Sears and the specialists who distribute our filter fabrics. This little test will help you check your knowledge of some basic fabric facts. It will also serve to remind you of the help always available through Wellington Sears. For more information write for "Filter Fabric Facts," Dept. M-10, Wellington Sears Co., 65 Worth St., New York 13.

2. Weaves are just one factor affecting filter fabric performance. Here are three basic weaves, satin, twill, and plain, plus one variation, chain cloth. Can you identify all of them?





3. These are cross-sections of Orlon\*, cotton, dynel, and nylon fibers. Which are which?









W ATILE

Turn upside down for answers

2. a. plain, b. twill, c. satin, d. chain 3. a. nylon, b. Orlon, c. dynel, d. cotton

1. a. monofilament, b. multifilament, c. spun single, d. plied

west reset \*DuPont's trade mark for its Acrylic fiber.

### WELLINGTON SEARS

FIRST In Fabrics For Industry • Wellington Sears Company, 65 Worth St., N.Y. 13, N.Y. Offices in: Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

Check 1305 opposite last page.



Check 1306 opposite last page.

#### Unions for Engineers?

Starts on page 27

people controlled by a union shop is completely inconsistent with professional activity.

#### Look Before You Leap

It is surely worthwhile for the engineer who contemplates joining a union to examine the history of similar organizations. It might also be well for this engineer to consider whether or not there is anything genuinely constructive in the activity of this type of labor organization. Did his company get started by a labor organization? Do the best ideas and the effective application of the ideas that keep his company in a competitive position come from people who are thinking in terms of "what can a union do for me"?

Are the intellectual activities that are necessary for keeping a company in business subject to limitations in the hours of employment or conditions of work? Can he feel that the economic position of his company - and also of himself - is enhanced by permitting the majority of the union members who vote to determine when and under what conditions he shall work, since his work is supposedly predominantly intellectual and varied in character, involving the consistent exercise of discretion and judgment in its performance?

#### A Negative Influence

Aside from the conflict between individual responsibility of the professional and the group bargaining of labor organization, it seems that unions exert a negative influence on thinking and judgment. Certainly the bargaining pressures of organized labor have a negative effect upon the attitudes of many management people.

Unions are constantly demanding to have voice in management decisions, without accepting any of management's responsibilities. They are, in many cases, a road-block to communication be-

tween management and employees. They have a detimental effect on the recruiting activities of companies — the more independent and selection individuals tending to shy away from union-organized firms.

#### What Do Engineers Want?

Among the objectives listed by most engineers is the opportunity for advancement, to be considered a member of the management team, adequate compensation, and steady employment.

The question of what a person should do with the 24 hours a day allotted to him is surely worth more than passing consideration. The time and effort involved in the work of a professional is usually not regulated by a clock. It is certainly more difficult to evaluate the daily contribution of an engineer to a company than it is to evaluate the contribution of a process operator.

However, this evaluation should not be too difficult for the graduate engineer who is willing to apply himself. Such men surely understand that employees must produce more by their efforts than the amount they take home in pay and fringe benefits. Is it not more constructive and more likely to prove of long-term benefit to concern himself with the value of what he is doing, than of what he can force the company to pay him?

Time spent on doing something useful, constructive, and profitable for the employer should result in more financial gain for the person performing these duties than time spent in a bargaining session. The fact that a classmate, or a tradesman, is earning more than an engineer is a strange argument for more pay!

Another objective of professional engineers is that management consider them part of the management team. It is often said that engineers complain that: "management wants engineers to think themselves as part of the team, but management does not treat us like we were part of

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the management team." This gripe is heard so often that it must have some factual basis. On the other hand, is unionism the way to convince management that engineers are management?

Another widely publicized objective of engineers is to obtain steady work. We frequently hear reference made to the practices of companies in years past of laying off engineers as frequently as production workers were laid off. The engineer today who feels that he must become affiliated with a union in order to obtain steady work must not be able to read or to listen. No student of labor organizations is so naive as to believe that economics or working conditions are supported solely by unionism.

The truly professional man has had the law of supply and demand do more for his economic benefit than labor unions or legislation have ever, or will ever, do. The market place for professional talent is free and open today. It is a simple matter for an engineer to determine whether he is being fairly compensated for his services, particularly if he has developed his abilities to speak for himself. He does not have to join a union!

#### Our Fuel Supply Starts on page 28

shale whose content ranges from 11 to 50 gal per ton. Most of this shale is in northwest Colorado, northeast Utah, and southwestern Wyoming.

Other recent estimates reported by Pratt also indicate the existence in the United States of an aggregate of one trillion barrels of oil in shales averaging 10 gal per ton. Eventually new technical advances may make it economical to draw on these reserves.

Large volumes of oil-bearing shales also exist in Canada, but even more spectacular is the volume of oil, estimated at 300 billion barrels, in the Athabaska tar sand of the province of Alberta in western Canada. Important but much smaller deposits of tar sand exist in the United

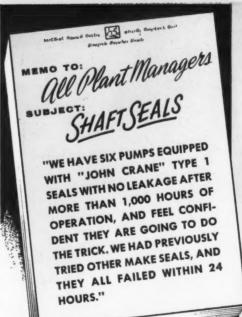
Comparably huge volumes of oil shale occur in Brazil and other South American countries, and again in various countries of the Eastern Hemisphere. Tar sands also are known to occur in very large aggregate volume on the other continents. Undoubtedly the known volumes of both tar sands and oil shale will be multiplied by future discov-

In these several deposits, then, the world possesses energy resources in the form of extractable petroleum comparably as vast or vaster than that in the deposits of liquid petroleum. From most of the huge volumes of shale and tar sand, oil is not commercially extractable today. However, continuing research efforts promise to make these resources economically available for supplementary sources of oil energy, as the need may arise in the future.

#### Liquid Fuels From Coal

The direct use of coal to produce energy is still extensive, although production is leveling off. However, new uses for our still vast reserves are indicated, as the volume of synthetic liquid fuel which can be manufactured from coal appears to be comparable to that available from all other sources combined. For instance, deposits of lignite and subbituminous coal in the western and other parts of the United States and Canada, which are not saleable for commercial use, could be recovered in liquid form or hydrogenated to form more than a trillion barrels of liquid petroleum. However, present indications are that the economic production of petroleum from shales and tar sands will enter the fuel picture well ahead of synthetic fuels from

Turn to next page



This is part of an actual memo

sent by one plant manager to

others of the same company in

different sections of the country-

and that company is now exclus-

ively specifying these and other

type "John Crane" Shaft Seals for

all their liquid handling require-

and expense by doing likewise.

You too can save time, trouble

You'll find a "John Crane" Shaft

Seal for every service . . . from hot

or cold water to the most destruc-

tive acids and corrosives . . . high

temperatures, high pressures . . . in

types and sizes to meet practically

any mechanical or dimensional re-

Send us details on your appli-

cation. We'll recommend the

proper shaft seal. Request Bulle-

tin S-204-3 for complete overall

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Designed for limited stuffing box diameter. Handles water, light hydrocarbons, refrigerants, mild acids and other liquids non-injurious to synthetic rubber at temperatures from  $-40^\circ \mathrm{F}$ , to



Designed for limited stuffing box length. Handles same services, temperatures and pressures as



Heavy duty, high pressures. Packaged construction for easy installation. Handles pressures to 1200 psi., temperatures from -40°F. to +250°F. Services same as Type 1.



Famous as a problem solver. Sealing members of chemically inert Du Pont Teffon. Engineered to service conditions to handle practically all destructive acids, practically all destructive acids, corrosives and gates at temperatures from -120°F, to +500°F,, pressures to 150 psi. Available in balanced construction for pressures to 750 psi.



Hamilton, Ont.



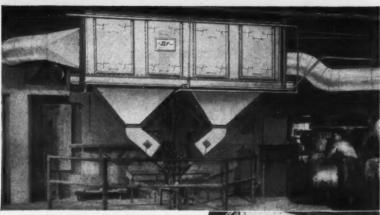






COMPANY PACKING

Check 1307 opposite last page.



Sly Dust Filter collects soapstone from green-tire-dusting operation.

# SCY DUST FILTERS Save Installation Expense at B. F. Goodrich

In B. F. Goodrich's huge, multistory Akron plant, dust is created at a number of widely separated processing operations. Individual dust control systems had to be engineered to service them. Piping and installation costs would have been prohibitive if dust filters had to be installed outside. Yet inside ceiling height is only 12 feet.

B. F. Goodrich engineers chose Sly Dust Filters because they provided the necessary compactness and the required capacity. Considerable Sly Filters collect soapstone and zinc stearate dust during processing of uncured garden hose.

Dust is automatically returned to dusting chamber.

installation expense was saved. The Sly Filters fit easily into the limited ceiling height and are, therefore, located close to the dust sources. Because they are nearby, complete dust collection is obtained more economically . . . collected materials can be used again . . . the filters are easily accessible for servicing.

At B. F. Goodrich, sound dust control engineering and advanced Sly Dust Filter design have paid off in substantial savings. Learn how you can benefit . . .

WRITE FOR BULLETIN 98 - "Dust Control by Sly"

Designers and Manufacturers of: Dust Control Systems,
Industrial Ovens, Blast Cleaning
Equipment, Tumbling Mills.

THE W.W.



MANUFACTURING CO.

4754 TRAIN AVENUE . CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

Check 1308 opposite last page.

#### Our Fuel Supply

Starts on page 28 coals and lignites.

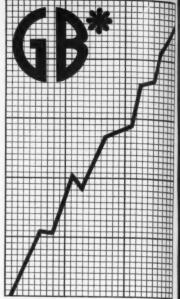
#### Natural Gas

An increasingly important factor in the world's energy picture is natural gas. Proved reserves of natural gas in the United States as of January 1, 1957, have been estimated by the American Gas Association at 238 trillion cu ft. Mr. Lyon Terry of the Chase Manhattan Bank estimates the ultimate potential gas resources of this country at 1000 trillion cu ft - a volume equal in energy value to about 167 billion barrels of oil. However, past experience in this country has shown that about 5000 cu ft of natural gas has been discovered for each barrel of liquid petroleum. In terms of this ratio, then, the total ultimate US natural gas resources might have to be put as high as 1200 trillion cu ft. I estimate that total ultimate natural gas resources of the world are at least 5000 to 6000 trillion cu ft. This is one of the reasons for the emergence and bright future of the petrochemical industry.

#### Atomic Energy

Many people question the part atomic energy will play in meeting our future energy requirements. With regard to uranium production and reserves, which today constitute the principal source of atomic energy, the veil that has covered such records is gradually being raised, but the few figures now available are still incomplete, and are not in all cases reliable. In a statement issued December 13, 1956, the Atomic Energy Commission released uranium production figures for the 18-month period of July 1955 to December 1956, as well as estimates of "measured, indicated and inferred ore" reserves for the principal producing states. Information on uranium production prior to mid-1955 remains classified.

From the 3 million tons of ore (average grade 0.25%,  $U_{\rm 3}O_{\rm 8})$  mined in the US in



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## \*means Good Business

For over half a century Good Business has been represented by Goslin-Birmingham, offering world wide service to users of mechanical and heat transfer equipment, including custom designing and foundry service.



G-B engineers are at your service at any time to discuss your processing problems.



Check 1309 opposite last page.

CHEMICAL PROCESSING

1956, approximately 6000 tons of U<sub>3</sub>O<sub>8</sub> concentrate were produced by the mills. However, capacity of the 12 uranium mills now in operation is given at 8960 tons of ore per day. As contracts for eight new mills with total capacity of 4025 tons of ore per day have been negotiated for completion in 1957 and early 1958, output of uranium concentrate may of 1957, and continue its rise indefinitely into the future.

Keeping pace with this growth in productive capacity. domestic reserves more than doubled in 1956, largely because of new discoveries and developments in New Mexico. The Atomic Energy Commission estimated US ore reserves at 60 million tons as of November 1. This volume of ore of average 0.25% U3O8 grade would, under present average mill recoveries, yield 150,000 tons of the oxide about a 25-year supply at the 1956 average rate of produc-

Good Busi-

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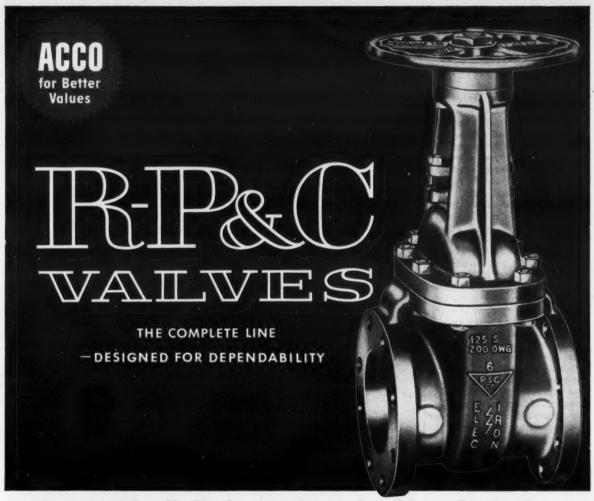
Other free world countries are following the lead of the United States in releasing production and other information. Notable among these is Canada, which estimates its uranium reserves — in mines under contract to the Government purchasing agency — at 225 million tons, which are figured to yield 237,000 tons of uranium oxide. One of the Canadian properties has the largest known uranium re-

Turn to next page



"Gentlemen, — let's face it..."

Thanks to Robert M. Brown, Douglas: Aircraft Co., Santa Monica, Calif.



## Created by R-PaC—made and sold exclusively by R-PaC...Electric Furnace Iron Valves

Electric furnace iron—introduced exclusively in R-P&C Valves—provides a high quality cast iron that meets the exacting requirements for pressure castings. Melted and refined under closest metallurgical supervision, R-P&C Electric Iron has physical properties far exceeding the minimum standards to which they must conform. It has a balanced chemical composition and a tough, dense body structure; and, it is more resistant to corrosion. All cast iron parts of R-P&C Valves are made of this Electric Furnace Iron.

Shown above is Fig. 625, a general service valve which is particularly applicable where full, unobstructed flow is desired. This type, available in bronze-trimmed or all-iron style,

either flanged or screwed, is made in fifteen sizes, from 2" to 24"—and is typical of the better values offered by the entire line of R-P&C Electric Iron Valves.

#### The R-P&C Line is Complete

The R-P&C line embraces gate, globe, angle and check valves in bronze, electric furnace iron and cast steel, and forged steel; all in a wide range of sizes, styles and pressure classes. Also, R-P&C offers specialties such as Lubrotite gate valves, bar stock valves, asbestos-packed cocks, cast steel fittings and pressure-seal cast steel valves. Order through your nearby R-P&C Distributor. For complete catalog, write our Reading office.





#### FREE WALL CHART

"How to Protect Your Valves"

Installation pointers, operating tips, clues to longer valve life. They are all on this 22" x 17" wall chart. Write for your free copy.

#### R-P&C VALVE DIVISION AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



Check 1310 opposite last page.

#### Our Fuel Supply

Starts on page 28

serves in the world, estimated at 137 million tons, or more than twice the reserve tonnage of all of the many US deposits. Production of oxide in Canada, recently running at about 3300 tons per year, is expected to increase rapidly to an estimated rate of 14,500 tons yearly by mid-1958.

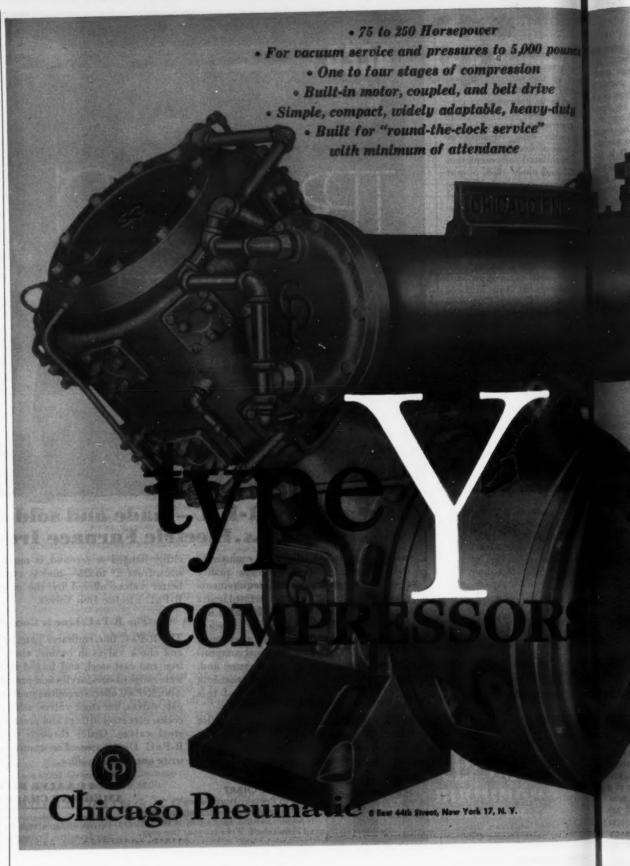
Potential uranium resources of present ore grade - and those of thorium and other energy resources - are unquestionably large, however, the inadequacy of present information makes it difficult to estimate how large.

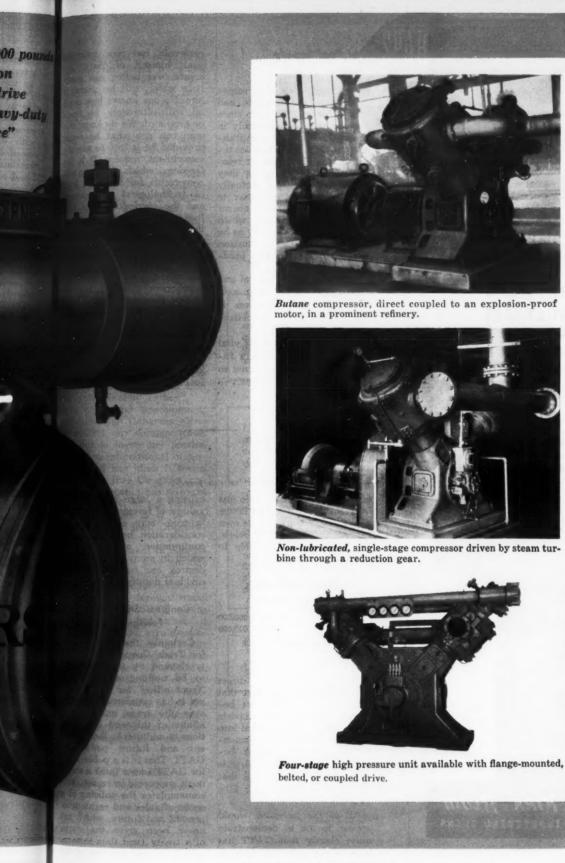
I am certain that uranium will play an important role in supplying future energy needs in specific areas of the world. However, many problems must still be solved, and commercial application of atomic energy to any significant extent is probably still far away. Even by 1975 it is not generally expected that the atom will be meeting more than 3% of the total free world demand for energy.

#### Petroleum Principal Source Of Energy

It seems clear, therefore, that petroleum will be called upon to meet the world's energy needs for many years to come. These needs show no signs of diminishing. In addition, petroleum is serving the rapidly expanding petrochemical industry throughout the world. Basing his figures on a concensus of oil industry experts, Wallace Pratt, in what can be accepted as the best thought on the subject today, estimates that free world demand for petroleum will probably be double the present 5 billion barrels per year by 1975. The United States alone is expected to require about half of this amount.

The prospect of rapidly growing demand in the future can hardly be said to be new to the industry. Nor, unfortunately, is it unusual to find some people who consequently dread shortages in the future. Since the day Henry Ford





launched his first mass-produced fleet of cars on the nation's roads, there have been some who, subtracting estimated future demand from estimated current proved reserves, have announced the imminent exhaustion of our oil reserves.

Of course we are running out of what is immediately available in our present stockpile; man has been doing this ever since he appeared on earth. The more we use, however, the more knowledge we accumulate to guide us in further exploration and in more diversified uses. So far our knowledge has been put to good use; we are still adding almost 1½ barrels of new oil to our reserves for every barrel we take from the ground.

I have already compared man's proved reserves of fuel to a shopkeeper's current "stocks on the shelves." To add to these stocks in the future we must, like the merchant, enter the warehouse in this case a vast structure at whose dimensions and contents we can only guess - and search for what we need. Admittedly this will not always be easy, and we will have to fashion new tools or at least find new ways of using those presently at our disposal.

#### Man's Mind Is Key To Fuel Supply

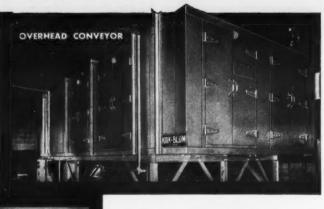
When primitive man first discovered how to smelt iron

Turn to next page



"I'd like to leave some literature with you on flow meters . . ."

CESSING





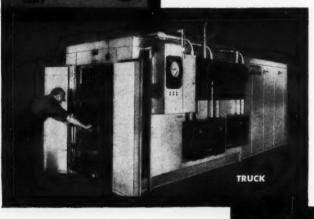
## what type OVEN do you need?

#### KIRK & BLUM INDUSTRIAL OVENS

Your oven needs . . . large or small, batch or conveyorized production, for drying, baking or dehydrating . . . can be filled by KIRK & BLUM.

Compactly designed and expertly engineered to meet specific requirements, these typical installations show the wide range of KIRK & BLUM experience over more than 50 years. Often, ovens up to freight car size are shipped assembled, ready to operate.

Put this skill and experience to work on your industrial oven problem. For complete information and booklet, write: The Kirk & Blum Mfg. Co., 3133 Forrer St., Cincinnati 9. Ohio.



KIRK & BLUM INDUSTRIAL OVENS

Check 1312 opposite last page.

#### Our Fuel Supply

Starts on page 28

he no doubt felt that something near the ultimate had been achieved. We have since advanced immeasurably in knowledge and accomplishment, yet our potentialities today may still appear as relatively limited to us as they did to our ancestors. Actually we are probably no closer to our ultimate goal, no nearer the infinite horizons which can open up to man only as he lifts his sights. Man's horizon is an attitude of mind, a product of faith

So let us not be cynical and think there is "nothing new under the sun." Progress is wrought by those who believe in "incredible" things.

Clearly, then, the most vital factor affecting mankind's future supply of energy is not so much the contents of nature's reservoir, but how man ce avail himself of them, an create ever better raw mate rials which will be useful to him. No one knows how much oil will ultimately be found or produced. We do know the man can get what he needs provided he is free to explore experiment, inquire. It is this freedom which is primarily responsible for the high level of technological achievement and the correspondingly high living standards which we is the United States enjoy. This freedom of opportunity must be preserved at all costs and made available to all men if the world is to be assured of ever more plentiful supplies of raw materials in the year to come.

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In the final analysis, man's mind is his most valuable asset — a "natural resource" of unlimited potential — and the key to an abundant supply of fuel in the future.

#### The Tariff Question Starts on page 31

demand" would have done just as well or perhaps a lot better if allowed to work out its own problems. The figures below, on US gross income, help to illustrate this point.

#### UNITED STATES GROSS NATIONAL INCOME

1920 1956 \$ 74,200,000,000 342,400,000,000

an increase of \$268,000,000,000 or 362%

Perhaps we should direct our attention to the fact that the relative difference between exports and imports from 1901 to 1956, divided into five-year sections, demonstrates that the relation between exports and imports is substantially the same as that which exists today, i.e., 61% (Fig 4).

All of the foregoing would appear to me to demonstrate quite clearly that GATT has been of no particular help in causing a large bulge in our volume of foreign trade. If this is true, why should serious consideration be given to the continuation of a program which in many ways tends to destroy our national and individual dignity?

#### Congress Should Control Foreign Trade

Certainly the Organization for Trade Cooperation (OTC) is claimed by its proponents to be nothing more than a "front office" for GATT, and yet it has considerable powers over the trade and internal affairs of this and other nations in addition to those present and future powers of GATT. That it is a police force for GATT seems to be a statement supported by reason, as it contemplates the policing of a series of rules and regulations, present and future, which has never been given the status of a treaty (and thus to some extent become the law of the

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land), nor has it even been approved in detail by either House of Congress. It is a policeman for a set of non-static rules made by 34 of our "friends" with or without our consent, but designed to control the operation of world trade by rules or laws not of our making.

Whether or not the legal academicians may consider this delegated power constitutional, to the layman the phraseology of the Constitutional to the layman the phraseology of the Constitution in the constitution of the constitut

Article I, Section 8,

"Congress shall have power to lay and collect Taxes, Duties, Imposts, and Excises."

Article I, Section 8, Clause 3,

"Congress shall have power \* \* \* to regulate Commerce with Foreign Nations, and among the several States, and with the Indian Tribes."

is a clear and unambiguous command for Congress alone to control our foreign trade, and not to leave any portion thereof to international organizations of any kind. It seems to laymen that Congress under the foregoing has no right to divest itself of the responsibilities placed in it by the people through their Constitution.

As an instrument of consultation, advice to governments, a forum for negatiation, and a creator of popular support of morality in foreign trade, the concept of GATT seems irreproachable, but when it becomes, as it is, a rule-making power which can upset our local laws, transcend our ideas of independence of action, prevent subsidization of our agriculture, or stymie antidumping protection of our industries - it becomes increasingly difficult for industry, labor, and capital to swallow.

#### GATT Will Ruin Coal-tar Chemical Industry

The vast number of coal-tar derivatives, probably more than 10,000 chemical articles, which are meeting destructive

Turn to next page



## Undisputed First Choice

with engineers who have had occasion to thoroughly test this type of filter. Shown here are structural features that are the result of over 30 years experience in building this one filter.



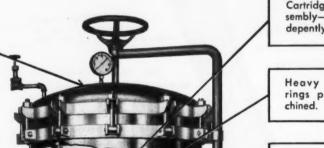
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Check 1313A opposite last page.

#### The Tariff Question

Starts on page 31

competition from abroad, make it imperative that the basis of duty which will equalize our domestic manufacturers' opportunities in the American market shall be on that of the American Selling Price of articles not necessarily chemically similar but which "when used in the same manner produce substantially the same results" as the imported article.

The infinite variety of chemical formulae possible under the chemical paragraphs of the Tariff Act make it imperative, if this important unit of our national economy is to be preserved in a healthy growing condition, that nothing more be done which commits the US to sell the industry down the river for the benefit of a theoretical increase in the volume of foreign trade.

Our duties have been reduced about 70%, and they are among the lowest in the world. GATT's prohibition against a dutiable value basis predicated on "national origin" of similar merchandise affects only the United States because it is the world's highest cost country.

The maintenance of this dutiable value basis even now does not reach articles which are manufactured from the products of coal tar distillation. Those articles can be chemically the same as the original coal tar derivative but be dutiable at a rate of duty having no relation to the coal tar schedule. Then it is said when that "article" comes into the United States it could be reconverted into its coal tar chemical form and marketed in competition with American made coal tar products. Not only should the American Selling Price be firmly maintained but it should be expanded to articles made from coal tar products.

The Randall Committee recommended the renegotiation of GATT. There are apparently among the proponents of this legislation many who believe that the OTC is a thoroughly innocuous bill designed



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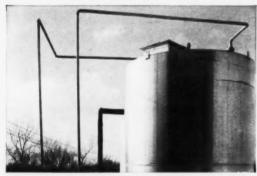
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#### The Tariff Question

Starts on page 31

to keep the books and run front office of GATT. We then, did the Randall Comittee strike at the roots this planned economy recomending renegotiation GATT, limiting its activito an investigative, consultive, and advisory body Governments or individuinterested in the subject fair foreign trade?

#### Coal-tar Chemicals Essential Industry

When we go back to dark days of 1914-1918, are reminded that once were wholly dependent Germany the aggressor most of the coal tar chemic necessary to our economy. ( government rather forcefu invited the Chemical Indus to expand immediately eit at their own, or governm expense, in an attempt to ta up the slack caused by cessation of German impo The manufacturers thus vited proceeded to build up now essential industry by very nature of chemical p gress. New and improved a cles compelled new and m expensive and extensive ar of research. Chemistry beca a parade of new products, p haps the most rapid mov the world has ever known That research can be kept only by the volume mar that exists in the Unit States. No substantial port of that market can be hand over to any foreign nat without disturbing the p duction volume of the Ame can Industry and its progr sively lower costs and sell prices.

It has been frequently stathat we need various production other parts of the womaning which are cited coff which is free of duty; which is free of duty; asbest which comes from our grounds.

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OCTOBER 1957

#### iff Question

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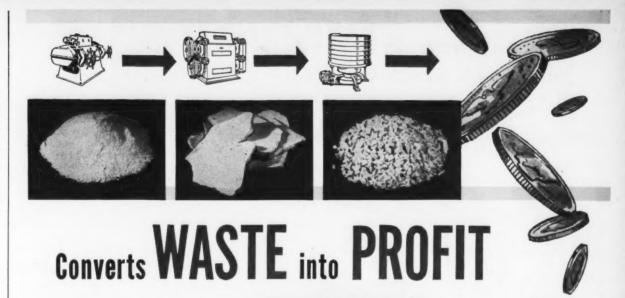
he books and run the ice of GATT. Why, I the Randall Comrike at the roots of ned economy recomng renegotiation of imiting its activities vestigative, consulta-I advisory body to ents or individuals I in the subject of gn trade?

al-tar Chemicals sential Industry

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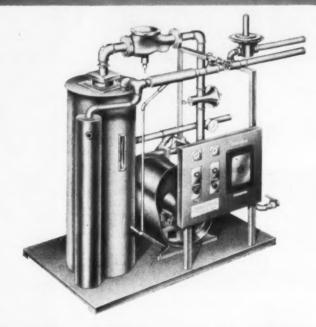
## **ALLIS-CHALMERS**



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REPRESENTATIVES IN PRINCIPAL CITIES

Check 1317 opposite last page.

#### The Tariff Question

Starts on page 31

friend Canada and is free of duty; wool, upon which we are not at all dependent on the rest of the world; gypsum, of which we have plenty; petroleum, upon which we are not dependent; ind ustrial diamonds which consist mostly of rough bort, which are duty free; and many other items, most of which fall within the 65% of our imports which are duty free.

Of course we need things from other countries just as they need things from us, but that is far from an adequate reason for slowly destroying the volume of our American market, rightly opposed by our own producers, in favor of foreign interests or importers who take the whole benefit of reduced rates and pass little or none of it on to consumers. Altruism has its place, but not in internation relations where there is no such thing as a national conscience but only a national self-interest. Let us take care of ourselves.

GATT May Reduce Us to Second-rate Chemical Nation

GATT is a socialistic concept designed ultimately to equalize economies throughout the world. That can only mean a leveling downward of ours. With the ability, and formerly demonstrated aggressive and frequently unscrupulous competition of certain foreign countries, we can again be reduced to a secondrate chemical nation.

These are the reasons which I believe motivated the Chemical Industry to demand a cessation of foreign controlled American trade, and the resumption by Congress of its powers and responsibilities

It is unfortunate that the President has so far exceeded the powers intended to be given to him by the Trade Agreements Act of 1934, as amended. There is no need to censure the Executive, nor to litigate the question of constitutionality. It is only necessary that Congress disapprove the OTC and write its own limitations to which GATT may be carried on.

#### Testing Food Additives Starts on page 48

long-range toxicological studies required for other types of food additives.

The recent delisting of FD & C Orange 1 and 2, Red 32 and the announced intention of the Food and Drug Administration to delist FD & C Yellows 1,2,3, and 4, despite their long history of use as "harmless and suitable" food colors, emphasizes only too late that such additives should have been subject to the imposition of maximum tolerance levels.

It was only their misuse, through carelessness or ignorance, that produced effects by reason of which the FDA could no longer regard certain of these colors as harmless. While the existence of tolerances can not insure against rare instances of violation, it at least provides protection

not only for the consumer but for food manufacturers who use additives properly.

The same principles concerning tolerances may have important application in the field of flavor chemicals, many of which, it may be added, contain a built-in safety factor in the form of an organoleptic limit of acceptability.

In any event, it is gratifying to note that some flavor manufacturers have begun to grasp the importance of pending legislation as it affects their business, realizing that sooner or later they will be faced with the alternative of establishing safety in an affirmative manner or run the risk of banishment from FDA's Commissioner Larrick's no-man's land to the purgatory of flavordom.

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#### Management Meetings

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identify the most difficult problems. At the end of this discussion, the small groups may work to develop ideas about overcoming the difficulties. This plan often results in improved inter-departmental communication and a sharing of ideas.

Among other techniques are the use of tape recordings to give flavor to a committee report, role-playing as a method for developing skills in human relations or for changing attitudes, and special uses of interview methods.

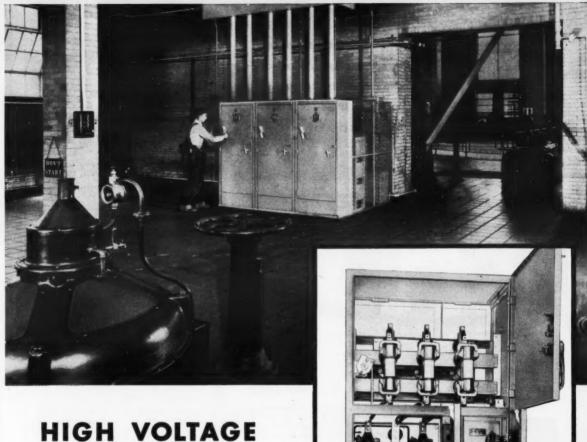
The latter has interesting possibilities. For example, an executive can be interviewed about company policy in front of the audience. The major points brought out may be summarized by the interviewer. Or the entire meeting may be set up as a kind of press conference, where the audience is invited to interview the executive. Obviously, this requires skillful handling. In any event, speeches by some company officials to their management people might be better-received if the audience had to coax the speech out of them.

#### 3-Predicting Response

After plans have been developed for the meeting, they must be inspected to decide their probable impact on the participants. Is the sheer volume of information to be presented so great that people will stop listening because they feel overwhelmed? Then we had better break up the material into smaller, more digestible bits. Have we allowed time for informal conversation among people who have not seen one another for a month or two? What provisions have we made for decreasing the fatigue of sitting in one spot for a long time?

Have we arranged to brief the audience on the program? Will everyone understand what he is expected to do and why? If we are using subgroups, are the chairs arranged so that they may be

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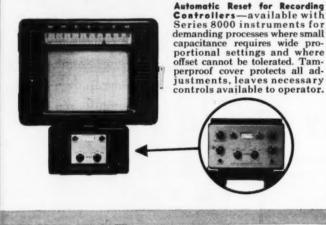
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Check 1319 opposite last page.

#### Management Meetings

Starts on page 50

conveniently moved? If the meeting requires a daytime and an evening session, have we allowed time for a rest period before or after dinner? Sometimes program planners are so eager to keep an audience busy they defeat the purpose of the meeting by tiring everyone.

One of the most important audience responses to be predicted is interest. Unless interest is held at a high level, attention decreases and important points are lost. A number of devices may be used to keep interest alive. One of the simplest is voice change. Instead of having a report given by one person, it may be broken into three parts, each given by a different speaker.

Another way of maintaining interest is to move the audience into different kinds of activity. For instance, they may listen to a brief talk, then fill out a questionnaire or checklist. Next, they may view a movie and discuss it in small groups. The principle is to change audience activity often enough to avoid boredom, but not so often as to create confusion.

#### 4-Modifying Original Plan

After we have predicted the audience's response at each point in the program, we shall see that some changes are needed. Perhaps we have weighted a morning session with speeches and allowed too little time for discussion. Perhaps we have planned for a film but did not allow time to prepare the audience as to the meaning and purpose of the film. We may discover that we have arranged for a panel to summarize their reactions to the day's meeting, but we have not planned time for them to prepare. Or perhaps the program is overcrowded, and we have not left time for stretching and relaxing between sessions.

At last the finished time schedule is written down. Each part of the program including coffee-breaks, lunch,

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15 YEARS SERVICE WITH ONE SET OF CUSHIONS



## Flexible Couplings

Up to fifteen years maintenancefree service is not unusual with Lovejoy lubrication-free flexible couplings.

Performance like this is practical proof of these soundly engineered features:

#### SIMPLE, RUGGED CONSTRUCTION Fewer parts. No intricate mech-

Fewer parts. No intricate mechanisms. Nothing to lubricate.

### LOAD TRANSMITTED BY CUSHION COMPRESSION

No wear on the metal jaws.

#### DOUBLE-LIFE CUSHIONS

One half of the cushions act as idlers—except on reversible loads. A quick interchange provides a new set of cushions. This can be done without dismantling the coupling.

Illustration atright shows a Lovejoy Type CF flange-mounted coupling. Rated at 160



hp., 800 rpm., this space saver connects drive shaft between diesel power unit and generator.

You can get Lovejoy performance for your application.

Let us know your requirements or request complete-line catalog.



#### LOVEJOY FLEXIBLE COUPLING CO.

4808 W. LAKE STREET • CHICAGO 44, ILLINOIS Mfrs. of Flexible Couplings, Variable Speed Pulleys and Transmissions, Motor Bases and Universal Joints.

Check 1321 opposite last page.

or free periods — follows a schedule. The number of people required for the program is determined and each part of it is assigned. One or two people are placed in charge of physical arrangements, blackboards, pencils, paper, and ash travs

#### 5-Evaluation of Meeting

Actual planning of meetings with the help of a skilled program builder is extremely useful. It is even more important to evaluate a meeting and learn from success and failure. Part of the planning for every important meeting should include arrangements for measuring some outcomes of the meeting, no matter how crudely it is done. One of the easiest ways is to observe the audience reaction during the program itself. Several people may be given the responsibility for watching the audience and listening to comments that are made during and after the meeting. This is not as valuable, however, as giving members of the audience a way to record their reactions in written form.

Often audience ratings are not enough to determine whether certain changes have actually taken place. We may want some measure of changes in actual behavior. For instance, if a meeting has been held for the purpose of teaching engineers or technicians how to write better reports, a committee may be appointed to study the reports actually turned in and see whether a meeting has produced a noticeable improvement. In training meetings, it is often a good idea to get the trainees to work out ways of being evaluated. By using their own suggestions, resistance to evaluation is diminished.

If a series of meetings has been devoted to improving supervision, we should try to find out whether supervisors have really changed their behavior. This kind of evaluation is extremely difficult and will probably require the help of personnel psychologists. In fact, this kind of evaluation may require a long investigation.



The Ridge Tool Company, Elyria, Ohio, U.S.A.

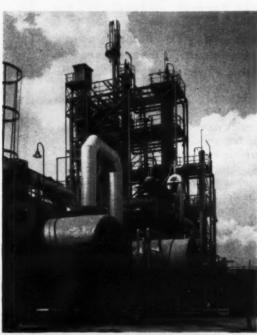


Check 1322 opposite last page.

Engineers at Stauffer's Le Moyne plant eliminated a potential air pollution problem by adapting laboratory model of gas chromatography analyzer to process use

# Monitors Hydrogen Sulfide Stream... Continuously

WILLIAM C. CLARKE, Assistant Editor With E. J. LUERICH, Plant Superintendent And ALVIN SCHALLIS, Process Engineer Stauffer Chemical Company, Le Moyne, Ala.



Carbon disulfide plant at Stauffer Chemical Company at Le Moyne, Alabama. Sulfur recovery unit, with burner, is in foreground. Main plant is in back



Engineer takes periodic reading of hydrogen sulfide level in process gas stream. Peaks indicate quantities of the gas

PROBLEM: Hydrogen sulfide, produced in large quantities as by-product at Stauffer Chemical's carbon disulfide plant in Le-Moyne, Alabama, demanded control and prevention of gas escape to the atmosphere.

While many details of Stauffer's process are confidential, it can be mentioned that quantities of hydrogen sulfide produced are so large that recovery is necessary for safety of operating personnel and is also an economic necessity, justifying an expenditure of over a half million dollars just for recovery facilities.

After burning the hydrogen sulfide and catalytically oxidizing the product to sulfur and water, Stauffer wanted to be sure all traces of the obnoxious gas had been eliminated. Some means was needed to determine exact extent the undesired hydrogen sulfide had been removed.

Solution: Le Moyne's plant laboratory already was using a gas chromatography unit for routine analyses. Part of its use included developing estimates of methane, carbon disulfide, and hydrogen sulfide in gas streams throughout the plant. Each analysis was based on small samples taken from each gas stream and introduced into the chromatographic analyzer.

Ease of running the samples suggested to engineers that a second unit might be set up in the plant to monitor continuously the burning of the hydrogen sulfide — giving greater control of the burner with a minimum of obnoxious tail gases.

Installation of the second unit was aided by availability of a column suitable for separation of hydrogen sulfide from other components of the gas stream. Column permitted complete resolution of the bands within a reasonable time — only ten minutes at a flow of 100 cc/min.

Key to the installation is a reproducible gas sampling valve through which a sample of the gas stream flows continuously. At intervals, a timing mechanism causes precision-measured quantities to be swept through the column for analysis. Simultaneously, sample gas input is disconnected from the sampling tubing and by-passed to a vent.

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Carrier gas used in this particular application is nitrogen. Instrument has a detectibility reaching one part in 100,000 so even minute trace quantities are measured. At temperature equilibrium, drift is relatively small - not even serious enough to warrant correction in normal opera-

Nitrogen, supplied by an external gas cylinder, is maintained at a constant flow rate by a pressure regulator. After passing through a flow meter, carrier gas passes through thermal conductivity detector. Difference between reference and sensing sides of thermal conductivity cell provides a voltage to drive a standard strip chart recorder. Measurement of peaks on chart furnishes quantitative analysis of stream components. After monitoring by chromatographic unit, process gas stream passes into a kiln heated to a high temperature to insure complete oxidation

vented to the atmosphere. Results: Since installation of the gas chromatographic analyzer, shortly after completion of the plant in August, 1956, no problems of air pollution caused by hydrogen sulfide have developed. In the event of possible failure of equipment in the recovery operation, plant operators by-

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We'll contact the manufacturer for you. He'll send you the details direct.

## MICRO SWITCH ... FIRST IN PRECISION SWITCHING



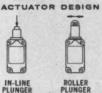
#### These low-cost MICRO SWITCH controls



TYPE LS SERIES—Rugged, small, reliable. Moving parts and switching chamber completely sealed. Two-circuit, double break contact arrangement. Operating force—3 lbs. max. No. 8 terminal screws accommodate No. 14 stranded wire.









increase production speed and efficiencyreduce breakage. waste and injury



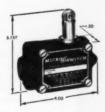
TYPE ML SERIES—Heavy duty limit switches. Combine rugged, sealed construction, precise operation and extremely versatile adjustability. Available in high-capacity, explosion-proof and two-circuit versions. ACTUATOR DESIGN

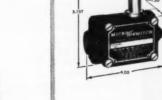






Thousands of plant operating men are using these versatile switches to upgrade present plant equipment













as high as 75 amps.

ROLLER PLUNGER



For complete Information Send for Catalog 83

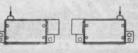


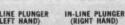
TYPE LN SERIES-High strength cast enclosure and design of plunger mechanism permit rapid, harmer-blow cam actuation without harm to enclosed basic switch. Extremely compact design often permits use in applications where no other switch will fit.

TYPE F SERIES—Rugged, compact precision switches with high current capacity. Seals make enclosure dust and oil-tight. Accurate repeatability. Available in either left hand or right hand designs. The SPDT series will make and break steady state currents of 20 amps. 125, 250 or 460 vac and handle in-rush currents

ACTUATOR DESIGNS

#### ACTUATOR DESIGNS









MICRO SWITCH precision switches for plant equipment are available in hundreds of variations of actuator designs, circuitry,

electrical capacity and terminal designs. See your nearby Authorized Distributor. Look under "Switches, Electric" in the Yellow Pages.

In Canada, Leaside, Toronto 17, Ontario . FREEPORT, ILLINOIS



Check 1323 opposite last page.



Check 1324 opposite last page.

#### INSTRUMENTATION

#### Hydrogen Monitor

Starts on page 140

pass gas stream containing hydrogen sulfide to a specially-designed flare stack equipped with alarm protection and a constant burning pilot. Complete combustion of the gases thereupon assures dilution and dispersion — although economic value of material is lost. (Model 154 Vapor Fractometer is product of Perkin-Elmer

(Model 154 Vapor Fractometer is product of Perkin-Elmer Corporation, Norwalk, Conn.) Check 1325 opposite last page.

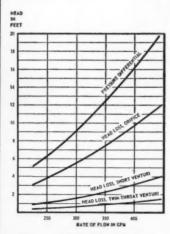
## Develops nearly twice pressure differential of usual venturis

Twin-throat Venturi tube permits power savings

Uses: As differential pressure producer for flow measurement.

Features: For same throat diameter as standard venturi, twin-throat venturi produces nearly twice the pressure differential.

Description: Inlet of twinthroat venturi is identical to standard short venturi. However, inlet is followed by a second throat just downstream of inlet contraction. This second and smaller throat causes an increase in velocity and curvilinear flow with conse-



Pressure differential and head loss of an orifice, a short venturi, and a 6" twin-throat venturi

### BROOKS LEADERSHIP

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#### NOW...

## new standardization permits



#### of BROOKS ROTAMETERS

A new interchangeable float design developed by Brooks brings new simplicity and practicality to rotameter instrumentation.

Now you can use the same basic metering float for flow indication . . . transmission . . . alarm signalling.

Now you can reduce spare part inventories and still have broad coverage for a variety of flow ranges and applications.

And now you can have oneday shipment of most Brooks rotameter models from delivery points conveniently located throughout the country.

If you'd like more information on this important new design achievement by Brooks, send today for Bulletin 110.

#### BROOKS ROTAMETER COMPANY



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Check 1326 opposite last page.

CHEMICAL PROCESSING

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quent reduction in pressure at point of low pressure reading. Differential pressure is thus increased while head loss remains virtually same as for a short venturi.

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Efficiency of twin-throat venturi tube permits a power saving since all losses caused by flow measuring device must be supplied by power avail-

Twin-throat venturi tubes are manufactured in range of sizes, from 4" inlet diameters to 40". Throat diameter can be selected to correspond with differential desired - with low head loss and minimum laving length.

(Twin-Throat venturi tubes are product of Infilco, Inc., Dept. CP, P.O. Box 5033, Tucson, Arizona . . . or for more information check 1327 on form opposite last page.)

#### Lists basic controls

More than 34 basic types of industrial temperature and pressure controls are depressure controls are de-scribed in 96-page catalog. General catalog — The Pow-ers Regulator Company, Dept. CP, 3434 Oakton St., Skokie, Ill. Check 1328.



"Top one's for startin', bottom is for stoppin', an' the middle one's for just pushin'."



ANCE V.S Jr.

All Electric Variable Speed Drive with Finger-tip Control

The new V\*S Jr. gives you instantaneous speed changes, even under load, without belts, pulleys, or gears. This Reliance Drive puts complete machine control at the operator's fingertips. All functions, jog, start, stop, reverse and speed changes are placed in a compact, remote control station.

The 8 to 1 motor speed ratio puts extra flexibility into your machinery. Speeds may be changed through this wide range as frequently as required. The motor will operate through a 100 to 1 speed range for jogging or light intermittent duty.

There's a big power cushion in the motor too . . . power for smooth speed pick up, even under heavy shock loads, and dynamic braking for fast controlled stops without shuddering or jerking.

The Reliance V\*S Jr. is your answer to machinery drive problems in the ¾ to 4 horsepower range. Package construction makes installation easy; just plug it in to a single phase 220 or 440 volt a-c. line.

Write for Bulletin D-2505 for complete details.

DEPT. 1410A, CLEVELAND 17, OHIO CANADIAN DIVISION: WELLAND, ONTARIO Sales Offices and Distributors in principal cities

Check 1329 opposite last page.

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#### ··· tolerance



Without quibble or qualification, a Meriam Manometer delivers perfect reproducible accuracy. This accuracy is absolute . . . no plus, no minus. Right on the button. The same differential will always produce the same column height. Not close to the same height, but exactly the same height. Other instruments struggle to come close. In a manometer, perfect reproducibility is inherent. It is routine . . . effortless. How closely do you wish to "read-out" this perfect reproducibility? There are over one thousand different Meriam Manometer forms to answer this question. Sensitivity is selective, depending on the indicating fluid used. For example, one form of Meriam Inclined Manometer, using water, will provide graduations a full tenth of a linear inch apart, equal to 0.0005 psig. Most important, Meriam has placed this perfect reproducible accuracy at the disposal of the plant operator as well as the lab technician. Rugged models serve along process lines outdoors as well as on central control panels.

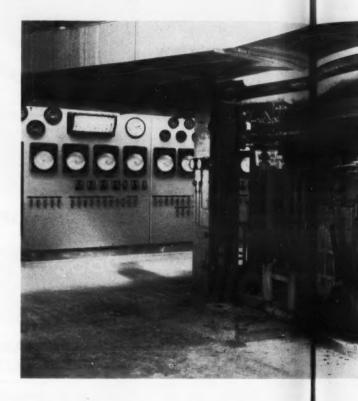
#### NEW

... complete and informative guide to manometer theory and practice as well as manometer models for plant, field and laboratory use. Just ask for Bulletin G-14-The Meriam Instrument Company, 10920 Madison Avenue, Cleveland 2, Ohio.



MERIAM MANOMETERS

Check 1330 opposite last page.



By using flexible, economical building block system for instrumentation, precise control of black liquor recovery process is obtained with less manpower needed so that —

## paper company saves \$20 with automatic cont

GORDON WEYERMULLER
Associate Editor

Problem: When a prominent paper manufacturer was planning a chemical recovery unit for black liquor, achievement of maximum efficiency called for integrated and completely automatic control. However, complete automatic combustion control was doubly difficult due to the nature of the fuel, plus the need for efficient chemical recovery. Liquor was difficult to burn because of the high water content, about 32%. Fuel-air ratio had to be

precise since insufficient air would cause incomplete combustion of the carbonaceous portion of the black liquor while too much air would hinder chemical reduction.

A black liquor recovery installation operates on alkaline liquor from the kraft pulping process. The black liquor from digestion step contains chemicals that must be recovered and reused in cooking wood chips. In recovery process, concentrated black liquor is sprayed into a furnace, where a combination drying and combustion takes place in suspension. Non-combustible material falls to the bottom

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CHEMICAL PROCESSING



Recovery unit with portion of control panel in background at left

## aves \$20,000 per year naticiontrol

where it undergoes chemical spare parts needed in stock reduction in a reducing at and simplifies training of opmosphere produced by carbonaceous material being burned. Basic reaction is as follows:  $Na_2SO_4 + 2C \rightarrow Na_2S + 2CO_2$ Recovery boiler also produces process steam, the required heat coming from the burning of the carbonaceous material remaining in the liquor.

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Solution: Building block method of instrumentation was used in designing control system for black liquor recovery boiler. Instrument building blocks give flexibility and simplicity since identical components can be used in different systems. This reduces

erating personnel and instrument servicing.

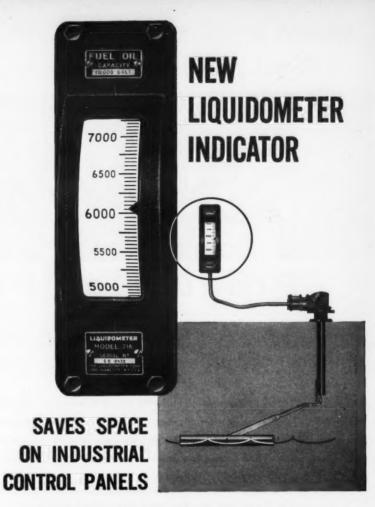
All of following control systems use these instrument building blocks:

1—Combustion control

A-Ratio of black liquor flow to total air flow is automatically controlled using multi-element ratio control components.

B-In the same manner, primary and secondary air flows are automatically ratioed to total air.

C-Furnace draft is maintained constant by a Turn to next page



#### Twenty-inch dial in 3x10%" case permits close readings

The new Liquidometer Model 216 Indicator gives the plant engineer a reliable, automatic reading of storage tank contents. Available in either vertical or horizontal design, the compact and highly readable Model 216 Indicator makes possible multiple installations on crowded control panels.

Teamed with Liquidometer's time-tested hydraulic transmission gaging system, the new indicator provides instantaneous remote indication of liquid levels-automatically. No outside power source is required. Virtually any liquid may be measured, and the indicator can be located up to 250 feet from the tank.

Engineered for dependability, the Liquidometer gaging systems highlight these design features:

Maintenance free

• Integral temperature compensation

• Ease of installation-requires only one 2" diameter tank opening

• Safety-all gages Underwriters approved for hazardous liquids



For further details on the new Model 216 Indicator, write Dept. D.

#### THE LIQUIDOMETER CORP.

SKILLMAN AVENUE AT 36th STREET LONG ISLAND CITY I, NEW YORK

Check 1331 opposite last page.

# is Sterilization a factor in your Product or Process?

Because much of the initial research on gas (ethylene oxide) sterilization originated at American Sterilizer, growing numbers of AMSCO-developed installations have been serving production and processing industries for more than eight years.

Here, as in the traditional Pressure Steam or Dry Heat methods, the American Sterilizer Company offers the world's largest accumulation of facilities, experience and research data on the broad subject of sterilization.

We have a complete range of techniques and automatically controlled equipment for standard or special installations . . . for laboratory, pilot plant or production application. Experimental and pilot plant facilities are available through our Research Department . . . and engineers of our Scientific Division are "on call" for consultation on such matters as production processes, techniques or packaging materials related to sterilization.

If any sterilizing process is or should be a factor in your product ... outline your problem to us.

We can help you!







DRY HEAT

SCIENTIFIC DIVISION



Check 1332 opposite last page.

#### INSTRUMENTATION

#### Black-liquor Recovery

Starts on page 144

single-element control system, using a low-range draft transmitter, control relay, selector station and control drive on induced draft fan coupling with characterizing positioner to "iron out" non-linear characteristic of final control element.

FISH Chemi

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2—Line heater temperature controls

Temperatures of the primary and secondary line heaters are held constant by automatically regulating steam flow to the heaters in response to temperature control system. Precise control of liquor temperature is necessary to assure uniform burning characteristics of the furnace.

3—Black liquor density control

Density of black liquor is controlled at the cascade evaporator by atuomatically regulating flow of weak liquor input and positioning the by-pass dampers to pass furnace gases either through boiler economizer, or directly to the cascade evaporators.

A thermo-converter is used to measure energy input to disc drives, proportional to density of liquor.

4—Level control
Level of cascade evaporator is controlled by automatically regulating liquor flow from evaporator in response to a liquid level control system.

5—Green liquor density control

Density of green liquor is controlled by automatically regulating flow of dilution liquor to dissolving tank, using differential bubblers for measurement of liquor specific weight.

6—Feed water control

A three-element feed water control system automatically maintains drum level from a measurement of steam flow-water flow ratio with readjustment from drum level measurement.

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## REAGENT CHEMICALS

AMERICA'S MOST COMPREHENSIVE STOCKS-AT YOUR SERVICE



Fisher/Fair Lawn is the only major plant ever designed exclusively for developing, manufacturing, analyzing and packaging laboratory chemicals. Only by building such a plant could Fisher assure high purity in over 7,300 chemicals offered to laboratories. So, next time-look to Fisher for your laboratory chemicals. Comprehensive stocks are maintained in seven key areas to serve you.



yours for asking CHEMICAL INDEX 120-C 370 pages listing 7,344 chemicals for laboratory use. Write:

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ME U.S.A. Chicago Philadelphia IN CANADA
on Cleveland Pittsburgh Edmonton
lo Detroit St. Louis Montreal
leston, W.Va. New York Washington Toronto

America's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

Check 1333 opposite last page.

INSTRUMENTATION

Results: Precise automatic control of black liquor recovery process has been obtained. An estimated saving of \$20,000 per year has been made with use of one less man per shift than would have been required had not automatic control been used.

Instrumentation of the black liquor boiler is considered to be an outstanding installation by all concerned with it. During the two years it has been in service, maintenance problems on the installation have been few and far less than before.

Recovery boiler is designed to handle 1,050,000 lb of dry solids per day. At 68% solids in the solution, this amounts to 130 gpm. The 350-ton-perday boiler generates 150,000 lb of steam per hr at 400 psi and 175°F.

(For further information on building-block instrumentation contact Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio.)

Check 1334 opposite last page.

(Recovery boiler is product of Combustion Engineering Co., Inc., 200 Madison Ave., New York 16, N.Y.)

Check 1335 opposite last page.

#### Pnuematic controllers

Standard and optional features of manufacturer's pneumatic controllers are described in 12-page folder. Folder ND4(9) — Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa. Check 1336 opposite last page.

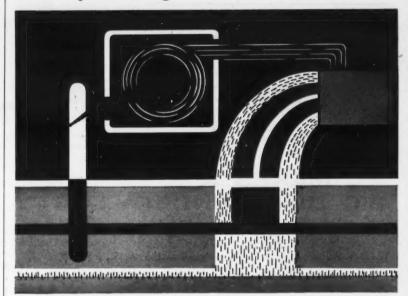
#### Senses relative change in concentration

Is controller for oxidationreduction

Uses: As regulator of either batch or continuous-flow processes - in conjunction with electric, electronic, or pneumatic controlling devices.

Features: Sensing cell of control system has straightbore design for unrestricted flow of stream to eliminate de-

## PNEUTRONIC Level Control Provides Proportioning Action at Low Cost



The new Fielden Pneutronic Level Control proportions flow and maintains level simply by combining an electronic "dip stick" with a proportioning pneutronic control. This dip stick has no moving parts, yet actually "senses" change in level and integrates the electronic and pneutronic units into a simple, dependable nullbalance system.

Electronically, the PNEUTRONIC Level Control features the versatile electrical capacitance method of measurement. As a result, it can detect minute changes in the level of any liquid, powder, or granular solid—conducting or non-conducting. The resulting change in capacitance changes output air pressure directly, and this output air then feeds back to balance the electronic circuit directly.

FEATURES

Null-Balance System
Only one vacuum
No moving parts in vessel
Only one vacuum
No moving parts in vessel
No moving parts in vessel

#### SIMPLIFY RECORDING AND CONTROL WITH Fielden



Through interchangeable input conversion units and rebalance elements, the same basic Fielden Null-Balance Recorder can record temperature or any other process variable. Other assemblies can be added for recording up to 96 points on one circular chart, for electric control, or pneumatic proportional control. Fielden also supplies other recorders, blind on-off controllers, manual monitors, automatic scanners, and a full line of sensing elements, supplies and accessories.

Send for Literature



FIELDEN INSTRUMENT DIVISION Dept. G. 2920 N. 4th St., Philadelphia 33, Pa.

Check 1337 opposite last page.

## THE REVERSE TWIST



#### MAKES A **BIG DIFFERENCE!**

You can readily picture the difference. In the Weston industrial bi-metal thermometer the sensitive element is a multiple helix rather than the conventional single one. Therefore a longer bimetal strip can be used, yet it can be wound into a shorter element with greater rigidity and stability, better repeatability, fast thermal response and the ability to withstand high overloads. In service this means sustained accuracy, over longer periods, at far lower over-all costs. Available in types, sizes and ranges for industrial applications and all builtin needs. Catalog T-13-K gives the complete story. Write . . . WESTON Electrical Instrument Corp., 617 Frelinghuysen Avenue, Newark 5, N. J.



## WESTON Bimetal

THERMOMETERS

Check 1338 opposite last page.

#### INSTRUMENTATION



Straight-bore design of redox controller reduces deposits and build-up

posits and plugging.

Description: Control system uses cell which is sensitive to changes in relative concentration of specific chemicals in liquids. Cell operates at pressures to 35 psi and can be used alone or with a self-balancing potentiometer.

Inert-metal electrode and reference electrode are large to minimize polarization effects. Contamination of reference electrode is reduced by reservoir pressure from 2 to 5 psi greater than static pressure in cell itself.

Manufacturer's self-balancing potentiometer, used with cell, allows continuous rebalancing to null balance, singleor multi-point recording on a round chart.

(O-R-P cell is product of Fischer & Porter Co. 2000 Jacksonville Road, Hatboro, Pennsylvania.)

Check 1339 opposite last page.

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We'll contact the manufacturer for you. He'll send you the details direct.



### and INDUSTRIAL CONTROLS

● Write for latest catalog covering the complete line of B/W Induction Relays, Relay Enclosures, Contactors and Starters, Multiple Pump Controls, Electrode Holders, Starter and Relay Combinations, Special Controls and Panels.

Controls will never trouble you, when you buy B/W

#### B/W CONTROLLER CORPORATION

2204 East Maple Road, Birmingham, Michigan

Check 1340 opposite last page.



Check 1341 opposite last page.



## What's a "New Solution"?

It's an article in CHEMICAL PROCESSING describing a new way of solving a tough plant operating problem.

In each issue you will find specific "case histories" showing how these processing problems were solved.

Each article states the operating problem . . . explains the process used and gives details of how problem was solved . . . shows results secured.

Take a look at "New Solutions" articles in this issue—they might suggest a "solution" for some of your tough processing problems.

#### Centralize control systems with these audio-tone transmission units

Device transmits 18 functions on one pair of wires

Uses: Telemetering quantities as pressure, temperature, level, flow, turbidity, chlorine residual, pH, conductivity from remote locations to centralized supervisory control system.

Features: Up to 18 functions, telemetering and controlling, may be transmitted over a single pair of private or leased wires, carrier current, radio or microwave mediums.



Device transmits up to 18 functions over single pair of wires

Description: Power supply units, receivers, and transmitters have "plug-in" design. Circuits are completely transistorized. Specially developed circuit design eliminates frequency interference on adjacent channels.

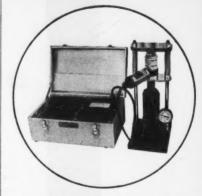
(Audio-tone transmission units are sold by Builders-Providence, Inc., a division of B-I-F Industries, Inc., Dept. CP, Providence, R.I. . . . or for more information check 1342 opposite last page.)

#### **Controlled volume pump**

Bulletin of 16 pages contains latest techniques in controlled volume pumping, and their applications in petroleum industry. Actual chemical metering systems are described. Specifications, capacity-pressure charts, and data for handy reference are included. Bul 457 — Milton Roy Company, 1300 E. Mermaid Lane, Philadelphia 18, Pa.

Check 1343 opposite last page.

## **Moisture Costs Money!**



Save the high costs of too much or too little moisture. Measure moisture content quickly, economically with Granular Moisture Register G5—insure product uniformity and quality!

I minute test! No stopping for time-consuming, expensive laboratory tests

Accurate readings to 0% within close tolerances

Use on production line! Voltage regulated electronpower supply, or battery operated. No skilled technicians required.

Two Weeks Free Trial! Test the G5 in your plant No obligation. Satisfaction is guaranteed.

#### **Guaranteed accuracy on these products!**

Ammonium Nitrate • Ammonium Sulphate
• Toilet Soaps • Plastic Molding Compound
• Polyvinyl Chloride • Ammonium Perchlorate • Sodium Bicarbonate • Polyethylene
Resins
DOZENS MORE

MUIS	URE REGISTER Instrument
	Moisture Register Co Dept. CPA, 910, Alhambra, Cali
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Check 1344 opposite last page.

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## Allis-Chalmers announces... Newly

Gang-operated disconnect switch isolates starter from incoming power — assures safe entry of high voltage compartments.

#### 2

Steel cubicle is compartmentalized — separates high and low voltage equipment.

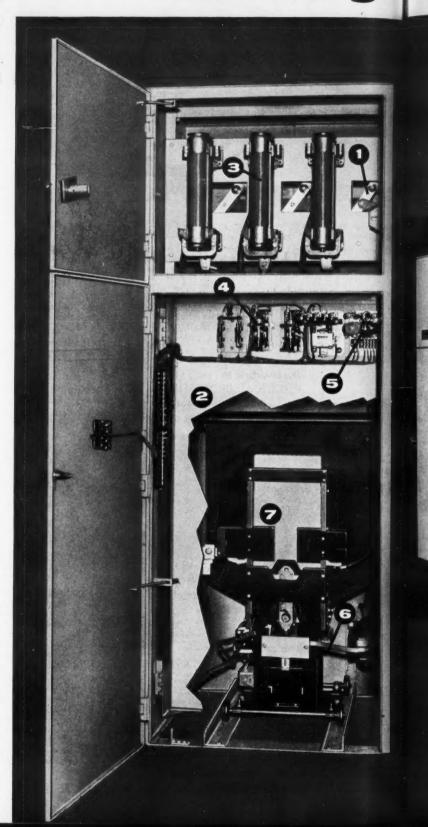
Short-circuit protection is provided by fast-acting currentlimiting fuses, rated 150,000 kva at 2300 volts and 250,000 kva at 4160 or 4600 volts.

Overload protection is handled by accurate relays which trip only on excessive motor current, preventing needless motor stoppages.

Undervoltage protection instantaneously opens line contactor on loss of voltage. Time-delay undervoltage protection also available.

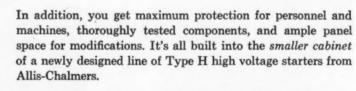
Mechanical interlock coordinates contactor, disconnect switch, upper door and inner control barrier for maximum safety.

Roll-out contactor makes maintenance easy—even in narrowest aisle space. (Routine inspection and maintenance can be done with contactor in place.)



# Designed Type H High Voltage Motor Control

Combines front access with space economy...

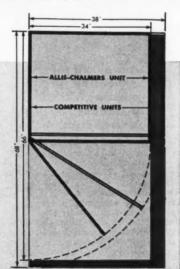


Here is control that couples compactness with roominess (for ease of maintenance)... here is a starter that joins test-proven performance with versatility (for addition of meters and relays) — AND the line meets every 2300 to 5000-volt motor need.

For more information on this engineering advance, contact your A-C representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS UNIT requires 2.3 sq ft less floor space than any competitive unit. Put 10 A-C units in the same area needed for 9 cabinets of other manufacture.

Indicates 2.3-sq-ft saving in floor space



**ALLIS-CHALMERS** 

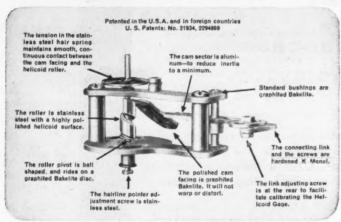


For more information on product at left, specify 1345 see information request blank opposite last page.





## These details of Helicoid gage design assure longer life and enduring accuracy

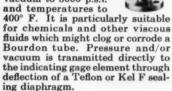


The superiority of Helicoid Gages is most evident in severe service-wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations.

The sustained accuracy of Helicoid Gages over millions of cycles is explained by the details of design and construction of the Helicoid movement shown above. Such Helicoid features-protect against wear and corrosion and assure sensitivity, sustained accuracy and trouble-free operation.

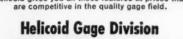
#### The Chemical Gage

The Helicoid Chemical Gage has a guaranteed accuracy of plus or minus 1%. It is applicable for working pressures from 30" vacuum to 5000 p.s.i.



For complete information on the Helicoid line of gages write for Catalog G-52





**AMERICAN CHAIN & CABLE** 929-P Connecticut Avenue - Bridgeport 2, Connecticut



stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack. Helicoid gives you all these features at prices that

**Tubes built for** 

millions of

pressure

To fit the wide range of applica-

tions. Helicoid Bourdon tubes

are available in four materials
—alloy steel, K Monel, stainless

from seamless tubing and are

carefully designed to give maxi-

mum torque and minimum

All Helicoid tubes are made

steel and phosphor bronze.

pulsations

#### low-cost digital computer solves important problems quickly enough to be of value



H. J. GALBRAITH Mathematician Callery Chemical Company Callery, Pennsylvania

Problem: We have, in our company, a relatively large number of mathematical problems too complex to be handled by desk computers within any reasonable time limit. These problems were accumulating at an alarming rate and required the use of some sort of digital computer if any were to be solved at all.

Problems were similar in that the input and output were relatively small but the internal calculations were very complex. Typical of these problems were: (a) calculation of thermodynamic functions for ideal gases from spectroscopic data using methods of statistical mechanics, refinement of X-ray structure parameters, and (c) fitting compressibility data for real gases to an empirical equation of state.

Solution: In March of this year, we put into operation a general-purpose computer. At the time, this model was so new that we obtained "number 3" off the assembly line. A typical problem which the computer has brought down to manageable proportions is calculation of tables of thermal functions for polyatomic gases. Calculation of free energy, enthalpy, specific heat, and entropy as functions of temperature for a gaseous polyatomic molecule can be made from measurements of vibrational frequency for each molecule, degeneracy of this frequency, and a constant for each molecule.

Although calculations follow straightforwardly from the formulas, the arithmetic is extremely tedious. The calculator goes through 7500 operations to obtain four thermodynamic functions at one temperature. It prints out these results, and then proceeds with next temperature.

Results: Considering calculating time alone, the machine

Check 1346 opposite last page.

152

CHEMICAL PROCESSING

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The co inexpensi ly simple to expand puter to tion and calculatio statistical will also as proble s capable LGP-30 Westches ter, N. Y Check 13

Describe

Details operation tank leve and illus bulletin. The John Dept. CP Clevelan 1348 opp

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does the same amount of work in one hour that a man at a desk calculator would do in about a month — if he used available short-cut aids.

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A program analyst required about two weeks to program the problem for calculating tables of thermal functions. However, the programming is general and may be used for any molecule for which molecular parameters are known. Once set up, the computer solves the problem in four hours.

The computer is relatively inexpensive and comparatively simple to program. We plan to expand our use of the computer to engineering distillation and propellant impulse calculations as well as general statistical work. Equipment will also be put to other uses as problems develop which it is capable of solving.

(LGP-30 computer is marketed by Royal McBee Corp., Westchester Ave., Port Chester, N. Y.)

Check 1347 opposite last page.

#### Describes tank gage

Details of construction and operation of manufacturer's tank level gage are described and illustrated in four-page bulletin. Bul 571—Oceco Div., The Johnston & Jennings Co., Dept. CP, 6917 Bessemer Ave., Cleveland 27, Ohio. Check 1348 opposite last page.



"Every day the same terrible decision where to begin!"



Fairbanks-Morse engineers designed this new dial line with your needs in mind ... based on exhaustive field reports. They're streamlined ... easy to read ... easy to use ... rugged to resist shock loads and rough handling ... easy to service and maintain. And, above all, they have the new, patented Floaxial dial mechanism that assures enduring accuracy. There are no knife edges or pin-point pivots to wear and affect long-life accurate weighing.

Dial chart and indicator are designed for easiest reading—ever! There's nothing to distract the eye . . .

you get faster, easier weight indication. Dial head swivels a full 360 degrees.

Get the full story from your Fairbanks-Morse Scale Expert or write on your letterhead for a copy of new, colorful bulletin that describes the full line of Floaxial Scales. Address Fairbanks, Morse & Co., Dept. CP-10, 600 South Michigan Avenue, Chicago 5, Illinois.



SCALES . PUMPS . DIESEL LOCOMOTIVES AND ENGINES . ELECTRICAL MACHINERY . RAIL CARS . HOME WATER SERVICE EQUIPMENT . MOWERS . MAGNETOS

Check 1349 opposite last page.

# Automatic

IN ITS SIMPLEST,
MOST ECONOMICAL FORMS



## SELF OPERATING CONTROLLERS

Self-contained and self operating, providing the simplest, most rugged and dependable controls available. Valve sizes ½" to 2". All required ranges. Styles for all equipment requirements.



Dependable expansion stem type — operates diaphragm valve on 18 p.s.i. air supply. Limits — 40 to 700 F. Direct and reverse acting types.





#### SIMPLEX PRESSURE CONTROLLER

Mounts on top of diaphragm valve or remotely on panel board, operates on 18 p.s.i. air supply.

#### NON-INDICATING CONTROLLERS

Simple and extremely compact – standard ranges for pressure controller to 300 p.s.f.—temperatures from low as 10 to high as 400 F.



Long life, trouble-free service and low cost are inherent characteristics of Weston non-indicating controllers. For any temperature or pressure system that is to be simple and fool-proof, these controls supply the answer. Write for catalog to-day. Weston Electrical Instrument Corporation, Newark 12, N. J.



Check 1350 opposite last page.

#### INSTRUMENTATION

#### Servosystems manual

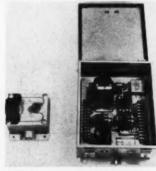
Laboratory manual of 32 pages furnishes framework for introductory laboratory an course in servomechanisms. feedback control systems, etc. Seven integrated, class-tested experiments are included in the manual. Practical applications of principles are stressed and theoretical material is kept to a minimum. To obtain "Servosystems Laboratory Manual" remit \$2.00 direct to Educational Services Dept., Servo Corp. of America, 2020 Jericho Turnpike, New Hyde Park, N.Y.

### Ignores starting shocks and transients

Monitors vibration changes to protect equipment

Uses: Vibration monitor system protects pumps, motors, blowers, compressors, centrifuges, engines, other rotating equipment from effects of dangerous vibration.

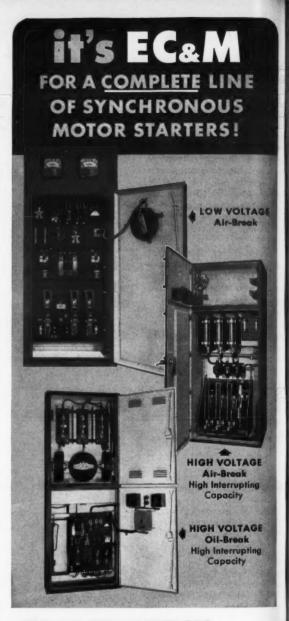
Features: Is sensitive to increases in vibration, yet ig-



Two components of vibration detection system are detector (at left) and control unit (right)

nores starting and transient shocks normal to operation.

Description: System combines malfunction detector for mounting on protected equipment and control unit. Detector is designed for Class 1, Group D; and Class 11, Groups F and G locations. Control unit is oil-tight and is installed in non-hazardous location unless connected with



#### FOR ALL LOW VOLTAGES AND FOR 2200-4800 VOLT POWER SYSTEMS!

• Fully automatic pushbutton operation. Motor pulls into step without delay because field is applied under best conditions for synchronization. Automatic field removal and re-synchronization. Internal wiring is complete for easier installation.

Write for Bulletins 8200 and 8820



THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY

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Check 1351 opposite last page.

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#### INSTRUMENTATION

an air line using optional air purge fitting.

Monitor system can be operated on 115, 230, or 460v AC. Models are also available for DC circuits.

Malfunction detector trips whenever vibration exceeds preset limit. Detector must reset in sequence several times before shutdown time relay will actuate.

System does not use vacuum tubes. Certain electrical parts subject to deterioration with time are normally "off" when system is operating.

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(Vibration monitor system is product of Fielden Instrument Division, Robertshaw-Fulton Controls Company, Dept. CP, 2920 N. Fulton Street, Philadelphia 33, Pa... or for more information check 1352 on form opposite last page.)

## Easily-installed control for proportioning and blending

Adapts to systems now in operation

Uses: Accurately maintaining flow rates in closed loop systems, or blending and proportioning in open loop systems. Will handle oils, waxes, emulsions.

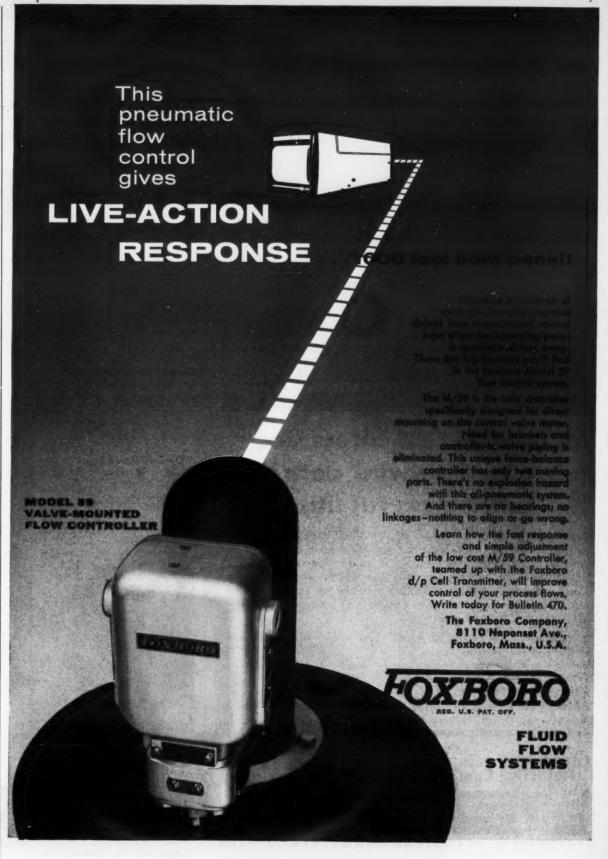
Features: Is easily installed, can be adapted to proportioning systems already in operation



Ratio controller of blending system holds preset ratio despite flow variations

Description: Blending control is electronically operated. Instrument can be located several thousand feet from the process. It avoids necessity of piping components to control station, and reduces installation costs.

Flow meter transmits elec-



Check 1353 opposite last page.



## Cambridge offers you complete wire cloth fabrication facilities

From giant retaining screens for catalysts or filter media to small strainer assemblies for Diesel engines, fabrication of wire cloth parts to a wide variety of demands is a daily operation at Cambridge. Whatever your needs . . . filter leaves, strainers, sizing screens, retaining screens . . . you can rely on Cambridge for quality and prompt service. We'll work from your prints or draw up prints for your approval.

IF YOU BUY WIRE CLOTH IN BULK, we can give you immediate delivery from stock on large or small orders from the most frequently used types of cloths . . . from the finest to the coarsest mesh.

Accurate mesh count and uniform mesh size are assured by individual loom operation and careful inspection just before shipment.

Let us quote on your next order for wire cloth. Call your Cambridge Field Engineer—he's listed under "Wire Cloth" in your classified telephone book. Or,

write direct for FREE 90-PAGE CATALOG and stock list giving full range of wire cloth available. Describes fabrication facilities and gives useful metallurgical data.





The Cambridge Wire Cloth Company

WOVEN WIRE WIRE CONVEYOR CLOTH BELTS FABRICATIONS DEPARTMENT F. CAMBRIDGE 10. MARYLAND

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Check 1354 opposite last page.

#### INSTRUMENTATION

trical signal proportional to flow rate of major component. Desired percentage of additive is set on ratio dial. Despite flow variations, preset ratio is maintained by means of a variable speed metering pump or metering valve.

Control can be installed on systems now in operation since most meters can be modified to produce necessary signal and valve controller can be mounted on stems of valves in service. Complete system includes rate indicating meter, ratio controller, and valve controller.

(Blendtrols are product of The Jordan Company, Dept. CP. 3235 W. Hampton Ave., Milwaukee 9, Wis. . . . or for more information check 1355 on form opposite last page.)

#### Centralizes control of remote-located valves, pumps

Gives positive control, indication of position

Uses: Indicating and controlling position of remotelylocated valves, gates, feeders, other devices.

Features: Position indicator-controller requires only two wires and a ground for



Continuously indicates—controls position of remote valves

operation. Control has three positions - open, close, and

Description: Instrument consists of two units, transmitter and receiver. Plug-in transmitter has three position

The Revolutionary New Solid **HEAT TRANSFER** MEDIUM SAVINGS UP TO 75% over JACKETED EQUIPMENT

> Thermon, the product, and Thermonizing, the process, represent a revolutionary new concept in the science of external heat applica-Thermon is a non-metallic tion. plastic compound with highly ef-ficient heat transfer properties, and is easily applied in a viscous paste form over either steam traced or thermal electric systems. It completely surrounds the tracer tubing and conducts heat to the entire surface to be heated.

Definite Advantages of Thermonizing are: 1. LOW COST—save up to 75%

over equal jacketed equipment.

2. EXCELLENT HEAT TRANSFER -Exceeds steam traced equipment approximately 1100% and very closely approaches jacketed

equipment.
3. DEPENDABILITY—no hot or

cold spots.
WIDE TEMPERATURE RANGE

-in case of equipment failure, Thermon separates product from

heating medium.

6. GOOD MECHANICAL AND THERMAL SHOCK RESISTANCE 

either steam traced or thermal electric equipment—installed at

our shops or your job location.

8. RAPID DELIVERY—use of standard equipment permits mini-mum delivery time.

Write for comprehensive brochure about revolutionary Thermon!

THERMON MFG. CO. 1017 Rosine . P.O. Box 1961 Houston, Texas

Check 1356 opposite last page. CHEMICAL PROCESSING

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switch for control, together with a 0 to 100% indicator to show percent opening. Receiver contains control relays and regulated DC voltage supply. Standard electric position transmitter originates position voltage.

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(Synchro-Scan position indicator-controller is product of Builders-Providence, Inc., Division of B-I-F Industries, Inc., Dept. CP, 345 Harris Avenue, Providence, R. I.)

Check 1357 opposite last page.

Times short intervals, calibrated directly in seconds

Designed for intervals from 0.05 to 10 seconds

Uses: As electrical timer for measuring short time periods from 0.05 to ten seconds.

Features: Timer dial is calibrated directly in seconds. Timing accuracy is maintained within 2% of initial setting.



Timer dial can be removed from unit for remote operation

Description: Reset timer has only two moving parts: the armatures of the two relays. Timer adapts to manufacturer's accessory plug-in mounting kits for synchronous motor timers and impulse counters.

Remote control variations of timer are available.

(Electroflex timer is product of Eagle Signal Corp., Moline, Ill.) Checks 1358 opposite last page. How to simplify control problems

Keep systems flexible, carry small inventory, cut maintenance cost with the **Bailey Building Block Method** of instrumentation and control.

What is the Bailey Building Block Method? It's using standardized Bailey measuring, transmitting, and controlling components and combining them into any system you need. Components can be added as needed...removed and reused elsewhere...recombined into another system when the need changes. It's flexibility plus!

It's all based on the simple fact that a Bailey instrument or control component doesn't care if the measured variable is steam flow, tank level, or tower temperature, to pick just three examples. System components—transmitters, receivers, relays, selector stations, power units—are standardized for multi-purpose use.

A spare component can be used in any one of many systems. Gone are delays waiting for shipments of special parts. Gone are large inventories of spares and parts. Simplified is the training of men for maintenance.

There are many exclusive features and advantages of the individual components used in the Bailey Building Block Method. And there's much more to the Building Block story itself.

For further details, call our local district office or write us at Cleveland. Our engineers will be glad to prove how the Building Block approach will save you money and simplify your instrument and control problems.



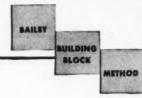








G36-1



BAILEY METER COMPANY 1074 IVANHOE ROAD, CLEVELAND 10, OHIO

In Canada — Bailey Meter Company Limited, Montreal

RESULTS IN: FLEXIBILITY, SIMPLICITY, ECONOMY

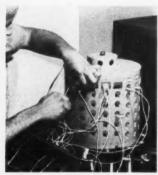


Check 1359 opposite last page.

#### **Process control computer** provides fully automatic plant operation

Digital computer acts as central unit of system

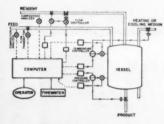
Uses: Providing fully automatic control of process plants. As central unit of a process control system, computer can automatically read process instruments, perform necessary computations and determine control actions that result in optimum plant operation.



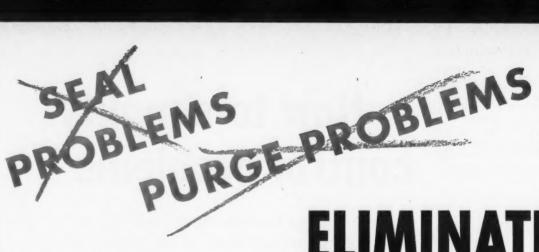
Magnetic memory drum of computer stores almost 8000 words, sufficient for several programs

Features: Computer can be connected directly to process instruments and control devices. It will accept inputs from many kinds of instruments as it incorporates integral input-output buffering, selection, and analog-digital conversion equipment.

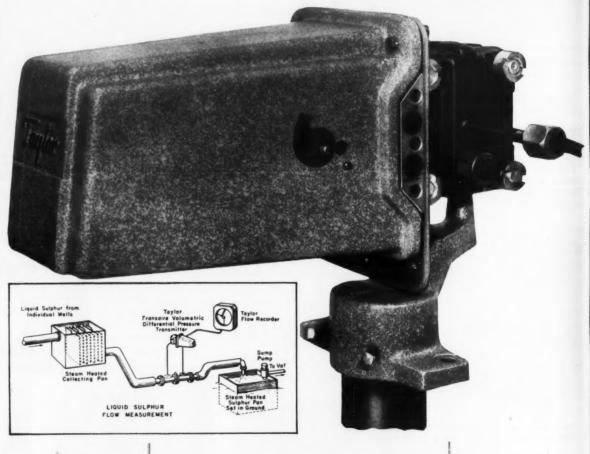
Description: Designed to be highly flexible, instrument is a stored-program digital computer. By changes in its instruction program and external connections, computer can be adjusted to modify and improve its control actions as



Schematic diagram of a possible computer control system for process plant



## **ELIMINATES** P





Type 95 flange, for use with chemical tee. For flow installations where diaphragm is flush with inside of pipe, so that process fluid imparts a scouring action. Also for liquid level applications where diaphragm should be flush mounted.



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# New Taylor Volumetric Differential Pressure Transmitter

# ES PURGE, SEAL PROBLEMS ECONOMICALLY!

Ideal for these difficult flow and liquid level measurements:

- Slurries
- Corrosive liquids
- Colloidal suspensions
- · Fluids that jell when not in motion.

The new Taylor 205T Volumetric Differential Pressure Transmitter is completely isolated from the process material. Thus it never has to be purged of deposited material, never suffers from corrosion. The pressure-sensitive diaphragms may be installed flush with the inside of the pipe or tank in a variety of mountings. The temperature limit is 300° F. at the diaphragms. Pressure limit of the instrument is 1500 lbs., and the system is limited only by the flange rating on the primary side.

This instrument is a modification of the familiar Taylor 333RD differential pressure transmitter, and is just as accurate, sturdy and dependable. For full details about this new instrument, ask your Taylor Field Engineer, or write for Bulletin 98281. Taylor Instrument Companies, Rochester, N. Y. and Toronto, Canada.

VISION - INGENUITY - DEPENDABILITY



Wafer type sensing element, for use with Standard 3" ASA flange, where diaphragm need not be flush mounted with process. For example, corrosive flow or liquid level measurement or colloidal suspensions. Standard diaphragm material, for both types, 316 Stainless steel, Hastalloy B, nickel.



Check 1360 opposite last page.

indicated by operating experience. It can also change control action from one process to another; change from data logging to fully automatic online control; change between control operation data logging and engineering computations.

Economic analyses of use of computer have indicated its application to existing plants, and specific control systems can produce benefits that will return the investment in one to three years.

Computer is fully transistorized and is console-like in appearance. It stands only 36 inches high, and is 55 inches long. Computer weighs approximately 400 pounds.

(RW-300 digital computer is product of Ramo-Wooldridge Corporation, 5730 Arbor Vitae St., Los Angeles 45, Calif.)

Check 1361 opposite last page.

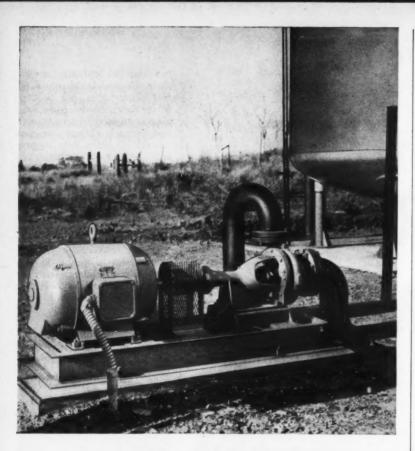
#### Small-case controllers

Catalog of 16 pages contains small-case instrument line for indicating, transmitting, and controlling pressure and temperature. Features such as glass fiber cases, which make instruments particularly suitable for use outdoors or in corrosive atmosphere, are pointed out. Cat 51-1450—Fischer & Porter Co., 212 Jacksonville Rd., Hatboro, Pa. Check 1362 opposite last page



"Nope, we didn't leave any tools inside before bolting it shut this time!"

SING



#### A Centrifugal Pump Salt Water Can't Damage!

Ampco Pumps are ideal for salt-water disposal and flooding operations:

- Transfer service
- Pumping over aerators
- Pumping through filters
- Back-flushing filters
- Delivery of treated water

It's an AMPCO...made from aluminum bronze that contains no zinc.

Ampco Pumps resist corrosion, erosion, abrasion, cavitation-pitting, and dezincification. They are made from Ampco alloys engineered specifically to resist salt water corrosion.

Durability isn't the only advantage of Ampco Pumps. They have high efficiency ... up to 85%. You pay considerably less for power.

Ampco Pumps are available in more than 100 different combinations, with speeds from 1750 to 3500 rpm; capacities to 600 gpm; heads to 300 feet.

Contact us in Milwaukee for the name of your nearest Ampco Pump Distributor.



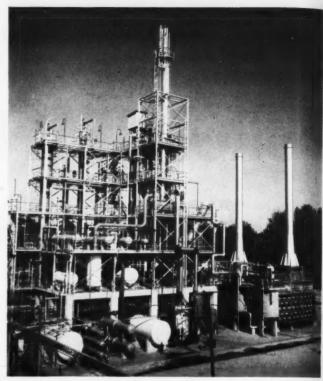
AMPCO METAL, INC.

Dept. CP-10, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif.

HE METAL WITHOUT AN EQUAL

Check 1363 opposite last page.

### CP CORROSION



Portion of Stauffer Chemical plant coated to resist carbon disulfide and sulfuric acid attack

# Plan the coatings when you plan the plant

That's what Stauffer did at petrochemical plant built at LeMoyne, Alabama — gaining the advantages of positive protection at lower costs

GORDON WEYERMULLER,

Associate Editor

With R. C. Holt
Chief Process Engineer
Stauffer Chemical Company
Chauncey, New York

Problem: Usually when a chemical plant is being built, structural steel arrives on location — prime coated all right — but nine times out of ten with a formulation not designed to withstand the corrosives encountered in the

plant. Expensive equipment is delivered, looking smart and shiny in its baked-enamel finish. In 60 to 90 days, it begins to show pitting and rusting Additional surface preparation is required to furnish proper protection. Even then, irreparable damage may have been done.

Steel reaches location with many different types of prime coatings which have little or no affinity for the top corrosion-resistant coating. Quite

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he entirely removed. This means additional expense. Corrosion that has already set in may make it difficult to provide the protection that would have been possible had the correct procedure been used originally.

Solution: When Stauffer Chemical was planning a new petrochemical plant to make carbon disulfide at LeMoyne, Alabama, engineers were determined to avoid having corrosion start before plant was even completed. Company decided to develop the proper coating system for each area and have the correct primer applied on equipment at the fabricator's plant.

In order to be sure that the correct coatings were used, chemical environment to be withstood was major consideration. Solvent action of the carbon disulfide had to be considered. Films had to have exceptional moisture vapor transmission resistance for this humid section of the country.

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As first step, laboratory of protective coating manufacturer coated small steel coupons with four generic-type coatings that might be able to resist carbon disulfide. Coatings were held to 1-mil thickness to intesify validity of test. Coupons were submerged in carbon disulfide for 100 hours.

Three of the coatings swelled, cracked, and exposed the steel after a few hours. Epoxy system was still holding tight after the 100-hour

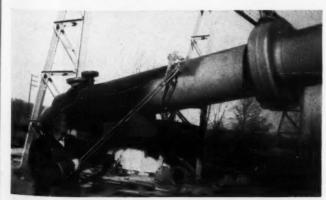
often the original primer must mark. It was agreed that the epoxy system would be the most satisfactory for the conditions to be encountered. This was done before Stauffer had contracted for structural steel. tanks, process piping, and equipment.

> In next step specifications were developed for fabricators. Surface preparation of structural steel called for removal of oil and grease with solvent and clean rags - removal of rust and loose mill scale with power brushes or sanding machines - and removal of all weld spots with chippers. All tanks and process equipment were sandblasted. Epoloid® Primer 7-E-20 was specified to a minimum 11/2-mil thickness. Coverage was estimated at 350-400 square feet per gallon.

> Instructions were given to fabricators, explaining the proportioning of the primer before application - one part activator to four of base material. Instructions for cleaning spray guns, brushes, and other information were included. Stauffer used a number of different fabricators in various parts of the country. Correct coating procedure was followed by all of them.

> On motors, valves, and scales - in addition to primer -two finish coats of the epoxy coating were applied in color specified. Harmonious scheme was used for the entire plant. Structural steel is light gray - tanks are cream-colored - ladders, walkways,

> > Turn to page 163



Modified epoxy coating being sprayed on reactor at fabricator's plant



#### Sulphuric Acid Sludge No Problem

for major oil company,\* in 1000-lb. transfer service

liquids like these: Boiling sulphuric acid (up to 50%)

Ampco Pipe success-

fully handles problem

Hot concentrated caustic solutions

Phosphoric and acetic acids

Phthalic anhydride

Phenols

Furfural

Brine

Name upon request

Its Ampco Pipe and Fittings resist corrosion

Many other companies avoid corrosion shutdowns this same way.

Ampco Pipe is made from an exclusive aluminum-bronze alloy that . . .

- (a) Resists many acids and caustics.
- (b) Withstands the action of abrasive solids in suspension - resists cavitation-pitting.
- (c) Has a Brinell hardness of 150 and tensiles up to 70,000 psi.
- Stands up under wrenches and hammers, without thread distortion and subsequent leakage.
- (e) Has high velocity tolerance flow rates of 18-20 fps.

You can get Ampco Pipe in all standard sizes, many from stock. Fittings are available to 3000 psi; flanges, to 5000 psi.

Write us concerning your problem.

AMPCO METAL, INC.

Dept. CP-10, Milwaukee 46, Wis. . West Coast Plant: Burbank, Calif.





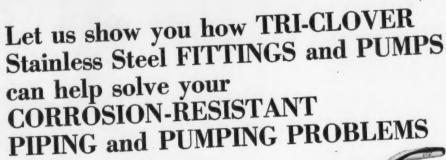








Check 1364 opposite last page.



For many years, Tri-Clover Division has specialized in the design and manufacture of stainless steel and Trialloy fittings, valves, pumps and custom specialties, serving the broad chemical-process industries.

Your selection of the *right* fittings, valves, pumps, and tubing for any specific application is made easier by Tri-Clover Division's complete production and engineering facilities. Completely equipped metallurgical engineering and research laboratories are your assurance of *Controlled Quality* products. Here is one dependable source fully qualified to help you solve your corrosion-resistant piping and pumping problems.

See your nearest TRI-CLOVER DISTRIBUTOR

Export Dept.: 8 S. Michigan Ave., Chicago 3, U.S.A.

Cable: TRICLO

In Canada: Brantford, Ontario

### LADISH CO.

Tri-Clover Division
Kenosha Wisconsin



Sanitary type tainless steel fittings and valves are available in a complete range of types and sizes.

"TRI-CLAMP" stainless steel fittings for both "permanent" and "take-down" liquid conveying lines in a wide range of types and sizes.



A full line of stainless steel tubing and pipe is available in a complete range of sizes.



Tri-Clover sanitary and industrial type centrifugal pumps are built for broad corrosion-resistant pumping service.

See the TRI-CLOVER Division Exhibit at the 1957 CHEMICAL SHOW

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RI-CLOVE

Clover industrial pumps and fittings serving a large pharmaceutical plant.

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#### Planning Coatings

Starts on page 160

and railings are green —
sprinkler system is toluidine
red — and process piping was
painted in a variety of colors
or banded to identify contents.

Only two types of coatings were used on the plant, the regular Epoloid epoxy and a modified form of same coating designed for elevated temperatures, which was used on reactors.

Results: Scheming the coatings when the plant was being planned and working closely with the fabricators helped to keep the structural steel, tanks, and equipment in good shape during construction and has prevented corrosion since plant start-up. Coating procedure undoubtedly saved labor and insured more positive protection. It will result in materially reduced maintenance costs.

(Coatings manufactured by Rowe Products, Inc., College Ave. and Hyde Park Blvd., Niagara Falls, N.Y.)

Check 1366 opposite last page.

#### Zinc coating 90% pure can be applied with brush

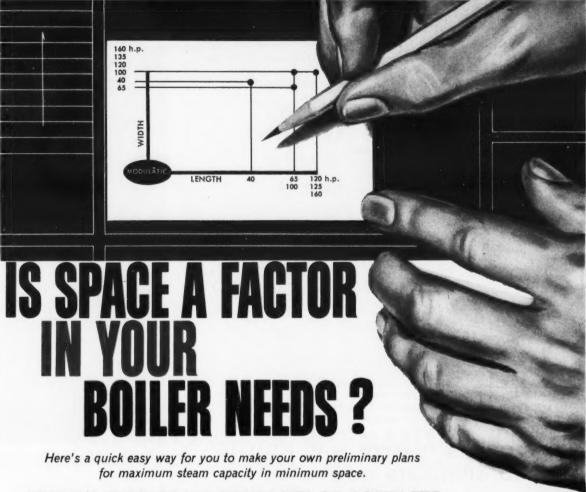
Uses: As corrosion protection for steel.

Features: It is possible to apply 90%-pure zinc metal coating with brush, spray, or roller.

Description: Manufacturer developed coating with basic research on epoxy resins abackground. Coating has good adhesion and flexibility.

(Epo-Lux Zinc Rich Zinc Dust Primer is product of Steelcote Mfg. Co., Dept. CP, 3418 Gratiot St., St. Louis 3, Mo. . . . or for more information check 1367 on form opposite last page.)

For more information on product at left, specify 1368 . . . see information request blank opposite last page.



## FREE 1/4 INCH SCALE TEMPLATE OF COMPLETE VAPOR MODULATIC WATER TUBE BOILER LINE MAKES BOILER NEED PLANNING SIMPLE

Set the template on your floor plan and select the size boiler you need—experiment with locations. Modulatic needs no enclosures, no chimney, no foundation. Put it where you want to use steam. On the roof, on a balcony, in an aisleway, hang it from the ceiling or put it in the basement. Proved by 25 years in America's toughest boiler rooms! 10 horsepower to 160 horsepower. From 5 pounds to 300 pounds pressure (higher when required).

#### VAPOR HEATING CORPORATION

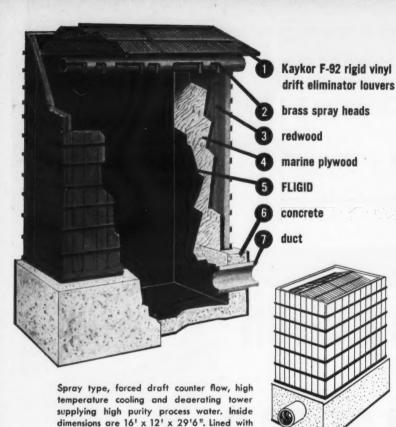
80 East Jackson Boulevard · Chicago 4, Illinois

s T Write for your free template and Bulletin 586—a postcard will do.

THE WORLD'S MOST COMPACT

POWER PACKAGE

Check 1369 opposite last page.



## line cooling towers with FLIGID® to eliminate corrosion

Kaykor Fligid by Wyatt's Plastics, Inc., Div. of

Wyatt Metal & Boiler Works, Inc., Houston, Texas.

While wood is the traditional material for cooling towers, corrosive process water—or chlorine compounds admixed during cooling—often make it a very expensive choice. Engineers faced with this problem at the Gulf Coast plant of a major processor solved it by taking a tip from the process vessels in the plant . . . and called for vinyl linings.

They learned that flexible linings like Kaykor L-10 could easily be applied, but wouldn't resist the calcium hypochlorite used to "bleach" the process water. And while rigid vinyl like Kaykor F-92 did resist the hypochlorite, it couldn't be efficiently applied to the tower walls.

As a result, the entire interior was lined with Kaykor Fligid...an amazing laminated lining material which has one L-10 face and one F-92 face. A standard Kaykor cement system makes it easy to apply the L-10 face to both the concrete foundation and the marine plywood lined redwood walls. And the exposed face of unplasticized F-92 provides the ultimate in lining strength and corrosion resistance.

Chances are one or all of these materials can solve your corrosion problems, whether they involve cooling towers or any other kind of process equipment. A vast network of qualified applicators and fabricators across the U. S. and Canada give fast and experienced service in the field or in the shop. If you'd like further technical information, we'll be happy to provide you with our General Bulletin 1000 on request.



EXAYKOR INDUSTRIES, INC. Division of Kaye-Tex Manufacturing Corp. 4401 Broad St. • Yardville, New Jersey

Check 1372 opposite last page.



Bottom three sections of CCI<sub>2</sub> column at Westvaco are made of type 3 Ni-Resist

When Inconel-clad and Ni-Resist are used at Westvaco for CCI<sub>4</sub> distillation column —

## alloys cut maintenance from \$10,000 to less than \$1000 per year

GORDON WEYERMULLER, Associate Editor

With WILLIAM VAN VLIET BACON
Chief Material and Inspection Engineer
Food Machinery & Chemical Corporation
South Charleston, West Virginia

Problem: Lower portion of cast iron column used at Westvaco for separation of S<sub>2</sub>Cl<sub>2</sub> from CCl<sub>4</sub> in the manufacture of the latter product failed in 9 to 12 months. Column shell was 34 to 1" thick, with internal diameter of 36". Temperatures vary from 257 in bottom to 176°F in top.

Bubble cap trays made of a high-quality cast iron were used in column. Some of these had to be replaced every time the column had to be cleaned, which was every four to six months. Plant had to keep an entire spare column on hand as a replacement.

Bottom and sides of 11/2"-

thick cast in conjur failed co months se 10' in d height wi top and handled from botto temperatu hoiler is fired bott tures ral ring burn outer rim Solution osion te oiler an were rep made fro alloys. Be er was m Inconel-c nese firetop of three se replaced sist (30° austenitio bubble c in service for top where te Vapor between and reb all made

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Control

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thick cast iron reboiler used in conjunction with column failed consistently after 15 months service. Reboiler was 10' in diameter and 8' in height with flared and dished top and bottom. This vessel handled 98% S2Cl2 coming from bottom of column. Liquor temperature in interior of reboiler is 280°F. Direct gasfired bottom metal temperatures range from 570°F at center - to 1100°F over the ring burner - to 900°F at the outer rim.

Solution: As a result of corrosion tests, column and rehoiler and connecting piping were replaced with equipment made from corrosion-resistant alloys. Bottom head of reboiler was made of 1"-thick 10% Inconel-clad A-212 manganese fire-box steel. Sides and top of reboiler and bottom three sections of still were replaced with Type 3 Ni-Resist (30% nickel cast iron) austenitic castings. Ni-Resist bubble caps were also placed in service. Cast iron was used for top two sections of still where temps are lower.

Vapor line and return line between reboiler and column and reboiler drop line were all made of Monel.

Results: Column and reboiler are still in service after 12 years of nearly continuous operation. Maintenance on CCl, system has dropped to less than \$1000 per year.

(Inconel-clad steel is product of Lukens Steel Company, Coatesville, Pa.)

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Check 1373 opposite last page.

(Monel and Ni-Resist are products of International Nickel Company, Inc., 40 Wall Street, New York, N. Y.)

Check 1374 opposite last page.

#### Controls corrosive fumes

Plastic, rubber-covered, and coated steel blowers, ejectors, and fans for handling and control of corrosive fumes are described and illustrated in four-page bulletin. Blower and fan bul — Heil Process Equipment Corp., Dept. CP, 12901 Elmwood Ave., Cleveland 11, Ohio. Check 1375.



F. J. Tompkins, Chief Design Engineer (right), Bernard Anik, Mechanical Engineer (left rear), Singmaster & Breyer, N. Y. C. Foreground, Michael De Piano, Cooper Alley Corp.

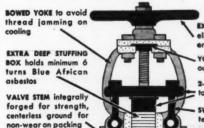
### TOMPKINS and ANIK of SINGMASTER & BREYER

tell why they build Cooper Alloy stainless valves into their basic plant designs

Q. Gentlemen, precisely why do you buy Cooper Alloy valves?

FJT—With me, dependability is the main reason. My major concern is overall plant design, and frankly I don't have time to worry about every equipment detail. As specialists in designing and building "first-of-its-kind" processing plants, we need valves we can count on, and can "build in" as part of our original design. Cooper Alloy valves, we've found, fill that bill.

BA—From my point of view as a mechanical engineer, it's the Cooper Alloy valve design that appeals to me. It has extra features, like the extra-large handwheel, unique square compression of packing, bowed yoke, integrally forged stem, and others, all of which make for less maintenance and longer, more economical valve life.



ROTATING DOUBLE DISC

for positive closure, and

to minimize galling

EXTRA LARGE HANDWHEEL to eliminate need for "persuaders"

YOKE NUT REPLACEABLE without valve disassembly

2-PC. GLAND CONSTRUCTION to prevent scoring of stem

SWINGING EYEBOLTS for maintenance convenience

FAIRED BODY-BONNET FLANGES for equal stress and uniform gasket loading

#### A VALVE DESIGNED FOR STAINLESS!

The Cooper Alloy valve is not an adaptation of earlier brass and iron patterns. Cooper Alloy, with over 35 years of experience in handling stainless steel, created a valve designed to be cast in stainless! Check the Special Design Features shown at left.

As the little CA man below is saying: "You can tell a Cooper Alloy Valve as far as you can see it!" Write today for your copy of our folder "Design Factors In Stainless Steel Valves." The Cooper Alloy distributor near you will be glad to show you the complete line of Cooper Alloy valves and fittings, and their advantages. He can serve you promptly from local stocks.



Corporation • Hillside, New Jersey

THIRTY-FIVE YEARS OF STAINLESS STEEL PIONEERING

Check 1376 opposite last page.

## STEELCOTE CORROSION NEWS

#### STEELCOTE EPOXY RESEARCH HAS PRODUCED MANY NEW PRODUCTS

In addition to EPO-LUX 100 and ZINC RICH ZINC DUST PRIMER. Steelcote research has produced epoxy products that set new standards of performance in the fields of floor repair and resurfacing, tank linings, boat bottom construction and repairs of cracks in metal. In addition, Steelcote manufactures a 15-minute dry floor enamel, DAMP-TEX wet surface enamel, HALTS-RUST for rusted metal and more than 100 other products.

#### INVITATION TO CORROSION ENGINEERS

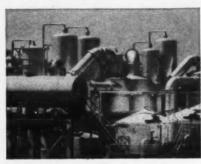
For information on any Steelcote product or for engineering service, write Dept. 8, Steelcote Mfg. Co., 3418 Gratiot St., St. Louis 3, Mo., U.S.A. In Canada: Steelcote Mfg. Co., Ltd., Rodney, Ontario. Jobbers in principal cities.

## Steelcote Epo-Lux Zinc Rich Zinc Dust Primer Licks Industry's Tough Corrosion Problems

Adhesion and Flexibility of Steelcote Epoxies Make Possible Cathodic Action of Galvanizing In On Site Application at About 1/3 the cost

Ninety per cent pure zinc metal coating, epoxy impregnated for adhesion

and flexibility, makes possible overcoats of EPO-LUX which protect against acids, alkalis, salts and solvents. This combination gives the longest-lasting, most effective corrosion control of any cold applied on site coating. We invite you to undertake an immediate test application.



Check 1377 opposite last page.

#### has CONVINCED thousands ... send for YOUR FREE "TEST CAN" of C-5 "hi-temp" ANTI-SEIZE THREAD COMPOUND! For chemical plant uses, on all studs and bolts exposed to temperatures up to 1800°F. such as on compressor up to 1800 r. such as on compression head assemblies, hot pump studs, auto-claves, reactor flange studs, heaters, heat exchangers, "cat" crackers, stain-less steel assembly. Try C-5 and see why leading re-fineries, manufacturers and power producers have made it part of their reg-ular preventative maintenance program. fel-pro "HIGH-TEMP" ✓ Ends Seizing and Galling even up to 1800°F. ✓ Reduces Wrench Torque ✓ Ends Stud Breakage Permits Repeated Re-use ✓ Speeds Assembly and Disassembly ✓ Protects Stainless Steel at all Temperatures ANTI-SEIZE THREAD COMPOUND C-5's exclusive colloidal cop-

per formula separates mating metal threads and surfaces with cushioning, protective copper plating. C-5 prevents galvanic action and eliminates pitting even when

dissimilar metals join. On mating metal surfaces, C-5 saves gaskets and countless man hours. WRITE IODAY... For Your FREE Test Sample Can of C-5.

PELT PRODUCTS MFG. CO. Dept. 54, P.O. Box 8609, Chicago 80, III

Check 1378 opposite last page.



Check 1379 opposite last page.

#### CORROSION

#### Plastic floor surfacing resists corrosion. needs no bond

Easy to apply and has good wearing qualities

Uses: As floor surfacing. Features: Material is highly resistant to oils, greases, solvents, organic acids, and inorganic acids. It needs no bond. is easy to apply, and is longwearing.

Description: Flooring material consists of preproportioned unit including liquid hardener combined with compatible resins, liquid epoxy resin, and properly graded silicas. Surfacing may be applied to any depth. Recommended temperature for application is above 50°F.

Unit of medium grading of aggregate covers about 20 sq ft, 1/4" thick. It finishes with slightly pebbled grain. Unit of fine grading covers about 35 sq ft, 1/8" thick. It finishes smooth and skid resistant.

(Thermo-Setting Plastic is product of United Laboratories, Inc., Dept. CP, 16801 Euclid Ave., Cleveland 12, Ohio. Check 1380 opposite last page.

#### Columbium and tantalum

Properties and applications of manufacturers columbium and tantalum metals and compounds are presented in fourpage bulletin. Cb, Ta Bul-Shieldalloy Corporation, Newfield, N. J. Check 1381.



"It's our mistake. We specified it to be exactly like the one in their catalog."

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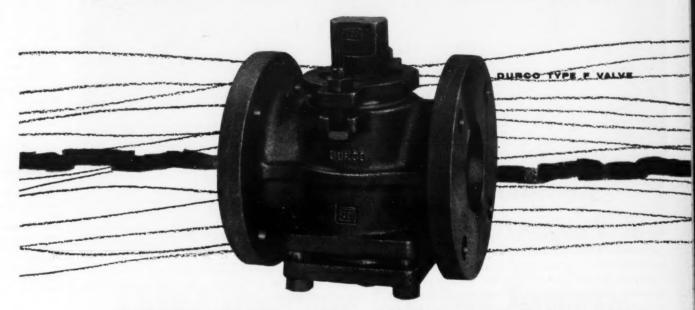
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ESSING



on maintenance run to thousands of dollars at Michigan Chemical Corporation • Saint Louis, Michigan



Previous valves on a chlorinator manifold at Michigan Chemical Corporation leaked so badly they required daily re-packing. The leaky valves were replaced in 1952 by Durco Type F valves. These original Type F valves are still in service and they have "resulted in saving thousands of dollars by reducing operating down time and maintenance labor."

Michigan Chemical Corporation is a basic manufacturer of industrial, agricultural, and pharmaceutical chemicals, and is a leading producer of

insecticides, bromine, bromides (organic and inorganic) magnesia, salt, and rare earth oxides, compounds, and metals. The installation described here is just one of several Durco valve installations at its Saint Louis, Michigan, plant.

Durco chemical service valves, pumps, and other engineered equipment can probably save money for you.

For answers to your tough corrosion problems, write or call The Duriron Company, Inc., Dayton, Ohio.

#### **DURCO TYPE F VALVES**



The mark of dependability in tough chemical service . . . everywhere

#### THE DURIRON COMPANY, INC. / DAYTON, OHIO

Branch Offices: Baitimore, Boston, Buffalo, Chicago, Cleveland, Detroit, Houston, Knoxville, Los Angeles, New York, Philadelphia, Pittsburgh, and Pensacola, Fla.

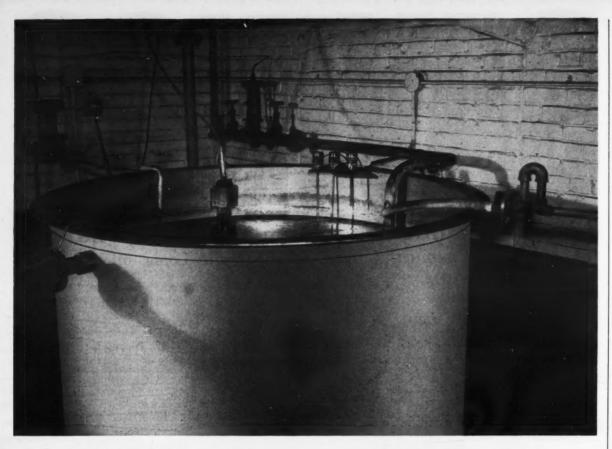
more information on product at

right, specify 1382 see information

opposite last page.

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For



## Another plant tames sulphuric acid with *[urpenter* Stainless No. 20 and No. 20Cb

An automatic sulphuric acid dilution system, with Carpenter Stainless No. 20 and No. 20Cb preventing corrosion at critical points, is cutting acid costs and reducing dangerous acid handling for a Tennessee textile plant. Savings with the system in its first year of operation equaled the total initial cost. Carpenter No. 20 and No. 20Cb control corrosion attacks of H<sub>2</sub>SO<sub>4</sub> concentrations up to 23% in a cutting tank (shown above), piping and pumps.

Whether you have sulphuric acid solutions or other strong corrosives to handle, see how Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs by keeping acid handling equipment on the line longer.



Write for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook containing physicals, corrosion resistance and fabrication data. These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets to meet your exact requirements.

See your nearest Carpenter Distributor for full information and help on your particular application for Carpenter Stainless No. 20 and No. 20Cb.

MEMBER



The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.-"CARSTEELCO"



Stainless No. 20 & No. 20Cb

Carpenter No. 20 bars, strip, wire and billets are available also from The Carpenter Steel Company, Reading, Pa.

Check 1383 opposite last page,

CORROSION

## Stainless steel, Teflon are only contact parts in valve flow-through

Uses: For corrosive gases and liquids.

Features: Medium that flows through valve contacts only 316 stainless steel and Teflon. Unit maintains packless advantage.

Description: Stainless steel valves are available in ½, ¼ and ¾" pipe sizes with ports from 1/16 to ¼". Valves are normally closed, angle pattern. Greenclad, waterproof, molded coils are used for temperatures to 250°F. Siliconeinsulated coils are used for higher temperatures.

("All 316" stainless steel valves are products of J. D. Gould Co., Dept. CP, 4707 Massachusetts Ave., Indianapolis 18, Ind. . . . or check 1384 on form opposite last page.)

#### **Corrosion-resistant lining**

Low-soluble, cement-based lining widely used in steel water heaters, tanks, vats, and other vessels handling bulk liquids is described in fourpage bulletin. Bul PF 17—Pocono Fabricators, Inc., Div. of The Patterson-Kelley Co., Inc., Dept. CP, East Stroudsburg, Pa. Check 1385.

## Unwanted coatings cut off without corroding base metal

Inhibitor satisfactory over wide temperature range

Uses: As corrosion inhibitor in sulfuric, sulfamic, and phosphoric acids.

Features: Soluble in both diluted or concentrated acids, economically low concentration of material permits acids to perform effectively, without attack on base metal, through wide range of temperatures. It does not precipitate after standing.

Description: Corrosion inhibitor is polar, organic nitrogen derivative. It is in liquid form, readily dispersable in at rigi and sh water. as low Physica

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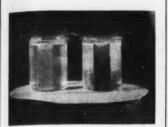
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Beaker at left shows Inhibitor 2508 in 0.3% of acid concentration keeping corrosive action on mild steel at minimum. Beaker at right contains no inhibitor and shows strong effect of acid

water. It can be used at rates as low as 100 to 500 ppm. Physical properties are:

Active (%)	50
Nitrogen (%)	3.4-3.8
Sulfur (%)	1.9-2.3
Pour point (°F)	-0
Cloud point (°F)	15
Specific gravity (@	25°C) .89
Flash point (°F)	70

(Inhibitor 2508 is product of Chemical Division, Armour and Company, 1355 W. 31st St., Chicago 9, Ill.)

Check 1386 opposite last page

#### Specific titanium-base alloys can now be produced

Nine master alloy formulations are available

Availability of special master alloy formulations that permit production of a specific titanium-base alloy without other additives has been announced. These master alloys provide extra aid to the melter by speeding up formulation and mixing, eliminate problems in raw material storage.

Master alloys available are: aluminum-titanium, vanadium-aluminum-titanium, manganese - aluminum - titanium, tin-aluminum-titanium, tungsten-aluminum-titanium, tantalum-columbium-aluminum, and aluminum-molybdenum.

(Master alloy formulations are available from Electro Metallurgical Co., Div. of Union Carbide Corp., 260 Madison Ave., New York 16, N.Y.)

Check 1387 opposite last page.

## **B.F.Goodrich**



## Skins become leather faster because of Koroseal

PROCESSING of leather at the Allied Kid Company of Wilmington, Delaware requires a good deal of muri-atic acid . . . and it's carried through B.F. Goodrich rigid Koroseal polyvinyl chloride pipe.

When other types of flexible and rigid piping were used, deposits built up within the bore and cut down acid flow. Weight, high cost, susceptibility to cuts and abrasions were other disadvantages.

Acting on the recommendation of chemical suppliers, Allied Kid installed Koroseal PVC pipe and find it has all the properties they seek.

Rigid Koroseal resists abrasions, has high impact resistance, is impervious

to muriatic and other acids as well as alkalies, salts and oils. Koroseal is light and easy to handle, cuts installation and maintenance costs. Koroseal's mirror smooth bore does not permit buildup of deposits within the pipe.

If you need pipe in your plant, whatever the purpose, be sure to investigate Koroseal PVC. Koroseal installations have contributed to greater efficiency and more profitable operations in countless industries. Koroseal PVC also is available in sheet and rod

For more information send in the coupon on your right. B.F. Goodrich Industrial Products Company, Marietta,

Check 1388 opposite last page.



INDUSTRIAL PRODUCTS

Dept. CP-10	Industrial Products Co.
Marietta, Ohi	
Please send me	free booklets on:
Rigid Koro	seal Pipe
Rigid Koro	seal Sheet
Name	
Name	
Name	-
Name	ч
Name Company Address	





## Flintkote's answer to economical, long term protection of metal and masonry

**HYDRALT\*** asphalt protective coatings are clay emulsions, reinforced within the film. Won't sag under heat. Won't get brittle or crack in cold. Will outlast any other form of bituminous coating exposed to weather.

They give best protection against moisture, corrosion, smoke and fumes. One coat of Hydralt is equal in thickness to many coats of paint. Stands up for years at lowest annual cost.

To restore old or leaky masonry buildings, protect with Hydralt. Give steel lasting protection with Hydralt. It is black, but if your finishing problem requires color a companion product...Decoralt ... is now available.

DECORALTI, a pigmented flexible latex base dispersion is designed to coat asphaltic materials and asphalt protected surfaces in color . . . red, green, white, cement gray, or variations.

It is weather resistant, opaque, full bodied . . . fortified with asbestos and minerals. Decoralt imparts desirable decorative finish over asphalt...wear resistant, too, over pavements.

Decoralt also seal coats masonry as a direct application for weather resistant, decorative finishing more durable than paints. Use it over concrete, cinder block, brick or stucco.

\*Res. U. S. Pat. Off. A Trademark of The Flintkote Company

Get full information about Flintkote's effective water proofing, corrosion proofing three coat system with color finish. Technical data sheets for these products are yours for the asking.

The Flintkote Company, Industrial Products Division, 30 Rockefeller Plaza New York 20, N. Y.

Chicago Heights . Detroit . Los Angeles . New Orleans . Philadelphia



In Toronto, Ontario: The Flintkote Company of Canada, Ltd. In London, England: Industrial Asphalts Company, Ltd.

## NTKOTE

Check 1389 opposite last page.

#### CORROSION CONTROL

Lightweight, high-impact polyester can be easily and quickly repaired with minimum of down-time. Material cuts costs of ventilation system.

## Ductwork resists fire and corrosion

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Section of polyester resin ductwork which resists corrosive plating fumes

170

Because of high corrosiveness and low flash point of plating fumes, large amounts of polyester resin ductwork were incorporated in ventilation system for world's largest rack-type plating machines installed at Hardware Division plant of Ford Motor Company, Monroe, Michigan. Hetron 92 polyester resin, reinforced wth layers of glass fiber mat has proven valuable in this application because of its corrosion- and fire-resistant characteristics.

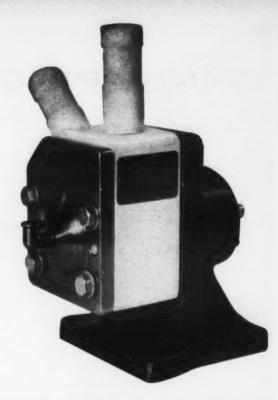
Since fires in coated stacks and ducts are very difficult to extinguish and can spread rapidly, fire-retardant exhaust system was imperative.

The installation, which has a capacity of more than 700,000 eu ft per minute, required 22 complete ventilating units. Polyester resin hoods, drops, plenum chambers, risers, and ductwork to air scrubbers, as well as fittings and stacks on exhaust side of air scrubbers were used. Plenums for scrubbers were as much as 42' long and 14' in girth.

Lightweight polyester ductwork appreciably reduced installation cost. For example, 9' section, 38" in diameter, with 1/4" wall, weighs only 185 lb, and can be easily handled by two men. Because of its strength and lightness, material required fewer hangers.

Anti-corrosive characteristic of glass fiber-reinforced polyester material is not affected by any alterations. Changes and repairs can be easily made on the spot with no risk of further fracture and with little production loss due to down-time. Although polyester material possesses high impact strength, should a heavy moving object break the duct, repairs can be quickly made by using glass cloth soaked with Hetron which sets up to form solid patch, integral with rest of duct. Rigors of periodic cleaning to remove solid deposits in low points of ventilation system do not impair corrosion resistance.

(Hetron 92 polyester resin is product of Durez Plastics Div., Hooker Electrochemical Co., North Tonawanda, N. Y.) Check 1390 opposite last page.



#### VANTON'S NEW TEFLON\* PUMP!

#### HOW VANTON DESIGN WORKS







Liquid flows in channel between molded plastic body and synthetic flexi-liner (1) . No liquid touches metal . Liner flanges secured to plastic body by bolted face plates (2) . Pumping mechanism is rotor mounted on eccentric shaft (3) . At each revolution it pushes liner against body block and sweeps a slug of liquid around the circular track from inlet to outlet . All bearings are outside of fluid area, and located within a protective stainless steel assembly in the event of flex-i-liner failure (4) . Liners are replaced in minutes, with pump in process line, by simply removing face bolts and face plate. slipping old liner out, new one in (5).

No stuffing-box or shaft seals to leak, contaminate, or require maintenance!

Long-term maintenance-free operation even with aqua regia!

Now at last, here's a pump to solve for good your problems of pumping corrosive or abrasive liquids or slurries! HCl, caustics, TiCl<sub>4</sub>, even fuming HNO<sub>3</sub> and fuming H<sub>2</sub>SO<sub>4</sub> (oleum), all yield to the combination of Vanton's unique pump design with Teflon and Kel-F\*\* elastomer, the outstanding new fluorocarbons that remain unaffected by even agua regia!

The Vanton Pump design eliminates stuffing boxes, shaft seals, gaskets, and check valves. Previously available in many other plastics and synthetics, its appearance now in fluorocarbon materials enables it to provide prolonged maintenance-free pumping of almost any corrosive or abrasive substance in commercial production today.

All Vanton pumps are self-priming, high-vacuum, and available in a broad range of capacities from 1/3 to 40 g.p.m. In addition to Teflon, they are obtainable in 7 body and 10 flex-i-liner materials, including polyethylene, Buna N, hypalon, Kel-F, etc.

\*TEFLON—Reg. trade-mark of Du Pont for its tetrafluoroethylene resin.

\*\*KEL-F—Reg. trade-mark of Minnesota Mining & Mfg. Co.

WRITE FOR NEW 8-PAGE VANTON CATALOG TODAY! It gives the whole story!





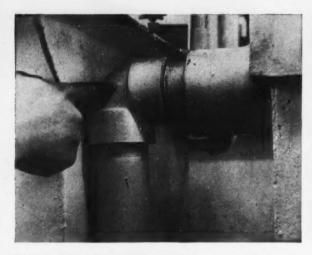
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SING

### PVC PIPING NEWS



PUBLISHED BY TUBE TURNS PLASTICS, INC. . LOUISVILLE 11, KENTUCKY



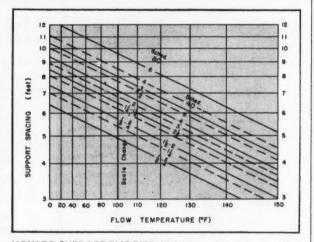
DRAIN LINES NOW PERMANENT. Former steel drain pipe and fittings on this pickle rinse tank oxidized quickly... lasted about a month. Replacement with PVC pipe and ttp fittings stopped this costly maintenance. Line is 2", schedule 80. Courtesy North Electric Company, Galion, Ohio. Contractor: Charles Hoffman Co., Mansfield, Ohio.



**THE FULL LINE... NEARBY.** Your Tube Turns Plastics' Distributor can deliver promptly from the complete line of **ttp** injection molded fittings, flanges, valves, solvent cement and thread lubricant. This one source can meet *all* of your requirements.



FIRST ALL PVC LIFT CHECK VALVE. Over 4 million cycles in 10% sulfuric acid solution and this valve still shows no sign of wear! Made of unplasticized PVC, it provides 100% flow area and may be installed in either vertical or horizontal position. Write for folder TTP 150.



**HOW TO SUPPORT PVC PIPE.** This chart gives recommended support spacing for PVC pipe of different schedules and sizes. Full explanation of this procedure and other valuable application data are given in booklet TTP 119R, free on request.

Leading Manufacturer of Injection Molded Polyvinyl Chloride
Pipe Fittings, Flanges and Valves

#### TUBE TURNS PLASTICS, INC.

Dept. P-9-B, 2929 Magazine St. . Louisville 11, Kentucky

Check 1392 opposite last page.

#### CORROSION

#### Installation in 15 minute, smooth sealing fitting, corrosion resistance

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Self-aligning coupling need no preparation of pipe and

Uses: For light-wall standers flow lines where corrose is factor.

Features: Only 15 minutes or less are required to instal coupling which provides smooth sealing action and a interior surface. No preparation is needed for pipe ends

Description: Self-aligning coupling has tapered gasked design and internal lip. This makes possible continuous stock flow with minimum build-up within lines. Gasket



No preparation needed for pips ends, and only open-end or ratchet wrench used to install self-aligning coupling

compresses within itself and moves uniformly around pipe, affording an allowance for misalignment of pipe ends.

Only open-end or ratchet wrench is needed for installation. Couplings are designed for working pressures of 100 psi and for pipe sizes up to 12". Gaskets are available in various compositions of synthetic and natural rubber.

(Swepco SS coupling is product of Swepco Fittings, Inc., 6 Clifton Blvd., Clifton, NJ.)

Check 1393 opposite last page.

#### Zirconium facts — corrosion issue

Brochure of eight pages discusses uses of zirconium's corrosion-resistant properties in various types of atomic reactors and in chemical precessing applications. "More ZR Facts", Vol 1, No. 2 — Carborundum Metals Company, Akron, N.Y. Check 1394.

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t pages diszirconium's properties f atomic remical procm'More ZR 2 — Carc Company, k 1394.

CESSING

Replace seals and cups of reciprocating pump in few minutes

Air motor of stainless unit is separate from fluid

Uses: For handling corrosive fluids.

Features: Seals and cups of stainless steel unit can be replaced in a few minutes, eliminating high maintenance costs and cutting "downtime" losses to minimum. Air motor is entirely separate making it impossible for fluid being pumped to mix with air.

Description: Stainless steel reciprocating pump will handle fluids ranging in temperature from -30 to +220°F at discharge outlet pressures of 1 to 11/2 times incoming air pressure. It will operate on air supply range of 30 to 200 psi and pump from one to 20 gal of fluid per minute, depending on air pressure used. All cups and seals meet requirements for pumping acids, stripper materials, brighteners and corrosive materials of various kinds.

(Stainless steel reciprocating pump is product of Balcrank Inc., Disney St., Cincinnati 9, Ohio.)

Check 1395 opposite last page.

#### Strong corrodents resisted by specialty stainless in uranium refining

Dipping basket, with 48"-square sides and bottom, is used by The Anaconda Company in new method of extracting uranium from ore in company's acid leaching circuit at its uranium ore processing plant, Grants, N. M.

Basket is loaded with ion-exchange resin and agitated in a tank. Slime-bearing sulphuric acid pulps containing uranium in solution flow through this tank. Uranium sulphate is removed from solution and held in the resin. Uranium is later eluted in nitrate solution and precipitated as high grade salt.

Turn to next page



## No HF corrosion with new Monel-clad vessel

Past savings prompt Catalin Corporation to add another Lukens clad steel alkylation reactor

Resistance to small amounts of hydrogen fluoride resulting from the hydrolysis of boron trifluoride catalyst—at 250 deg. F. and 50 psi—is a major design requirement for Catalin Corporation's alkylation reactors.

Catalin met the requirement and kept original costs down in reactors such as this with Lukens  $\frac{5}{8}$ " 20% Monel-clad steel. Monel cladding adequately resists the hydrogen fluoride. The low-cost A-285 backing steel provides the initial economy over solid high alloy. Be-



Alkylating kettle of Lukens %" 20% Monel-clad steel promises corrosion protection, economy at Catalin Corp.'s Fords, N. J. plant.

cause the kettle is jacketed, heat transfer is enhanced by the clad steel. The material also resists abrasion. Long life is assured.

It's another example of how Lukens clad steels, from 3/16'' gage up, are improving efficiency and saving money in the chemical industry. Only Lukens gives you a choice of 19 cladding and 11 backing metals—to meet virtually any tank or pressure vessel need. Consult your equipment builders or write for new technical booklet, "Clad Steel Equipment." Address Manager, Marketing

Service, Room 951, Lukens Steel Company, Coatesville, Pa.

This is Lukens clad steel—not a lining, not a soldered-on surface, but a solid steel plate—one side corrosion resistant

corrosion resistant metal permanently bonded over-all to a rugged, economical backing steel.



Helping industry choose steels that fit the job

Check 1396 opposite last page.



Down in the hold of a Chemical tanker

> ... Proof that nickel handles hot 73% caustic without corrosion damage

> > Here you are . . . at the foot of the ladder in a caustic cargo tank of the Marine Dow-Chem.

Notice the ladder itself. Run a finger along the rail. Look at the tank wall. Touch it. Not a sign of corrosion. Nothing to show that hot, 73% caustic has been the cargo for 21/2 years. The Lukens Nickel-Clad Steel, the nickel ladder, the nickel heating coils have remained sound and protected the cargo from metallic contamination.

#### Get a rundown on "The Resistance of Nickel and Its Alloys to Corrosion by Caustic Alkalies"

This is the subject of Inco's valuable Techical Bulletin, T-6. Make sure you have a copy for your files. Write, too, for help

with specific caustic corrosion problems. Address the query to Inco's Development and Research Division.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N. Y.

**NICKEL...** for purity

Check 1397 opposite last page.

#### CORROSION



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Dipping basket made of specialty stainless resists strong corrodents in uranium refining

Starts on page 173

To successfully withstand the combined corrosive attack of dilute sulpuric acid, am monium nitrate solutions, and small amounts of chlorides, a basket with frame members and 35 mesh screen (covering five sides made of a specialty steel known as Stainless No. 20 was used.

(Stainless No. 20 is product of Alloy Tube Div., The Carpenter Steel Co., Dept. CP, Union, N.J. Check 1397A on form opposite last page.)

#### Corrosion-resistant valves feature full flow, positive shut-off

Easily inserted or removed from line

Uses: For fluid systems where corrosion problems exist from internal, external, electrical, or naturally corrosive elements.

Features: Unit features full flow and positive shut-off in



Easily inserted ball valve has straight-through design permitting free flow

CHEMICAL PROCESSING

174

both directions. It is easily inserted or removed from line without special tools, serving as its own union.

Description: Quick-opening and self-lubricating ball valve is available in PVC, Penton, polyethelene, and co-polymer materials. Self-lubricating properties of Teflon seals make valve easy operating and longwearing. Seals resist abrasion and are easily insertable. Valve comes with female threaded ends in 1/2 to 3" nominal pipe sizes. Allowable temperature, depending upon material, is over 200°F in continuous duty. Valve is rated at 150 psi.

(Ball valve is product of Chemtrol Corporation, Dept. CP, 1417 W. El Segundo Blvd., Compion, Calif. . . . or for more information check 1398 on form opposite last page.)

#### Plastic pipe, fittings

Complete tables on pressure drop through plastic pipe, pressure-temperature ratings for different sizes, and recomended pumping depths are included in manufacturer's eight-page plastic pipe and fittings bulletin. Bul AD-2205— Crane Co., Dept. CP, 836 S. Michigan Ave., Chicago 5, Ill. Check 1399.

## Plastic laminate material resistant to wide range of acids, alkalies

Uses: For exhaust hoods, ducts, stacks, fume scrubbers, and tank covers for pickling, plating, and chemical plant operations up to 250°F.

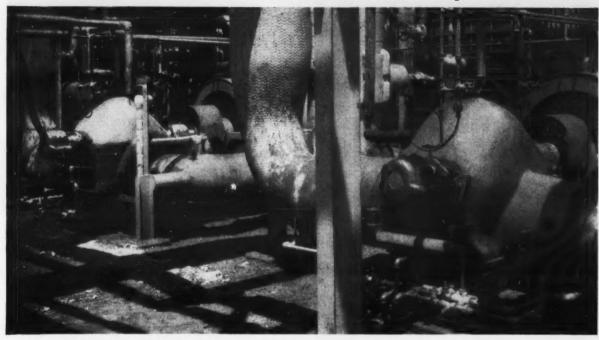
Features: Light-weight material is resistant to wider range of acids and alkalies than previously possible in similar material.

Description: Two-ply construction material is glass fiber reinforced laminate of thermosetting resins.

(Rigiply is product of Heil Process Equipment Corp., Dept. CP, 12901 Elmwood Ave., Cleveland 11, Ohio . . . or for more information check 1400 opposite last page.)

#### Allis-Chalmers

### **PUMPS** Solve a Chemical Industry Problem



# All-Stainless-Steel Pumps Handle Hot Corrosive Liquids

Manufactured on duty-specifications from the customer, these Allis-Chalmers Type SG stainless steel pumps are successfully handling a highly corrosive mixture of carbonate, urea, oil, and water at 260 F.

This is another example of the way Allis-Chalmers serves the chemical industry with a wide range of types of pumps in all sizes. These versatile, high efficiency Allis-Chalmers pumps are available in many special materials to meet specific application requirements.

For full information on how Allis-Chalmers can help you reduce costs, contact your local Allis-Chalmers district office, or write Allis-Chalmers, General Products Division,

Milwaukee 1, Wisconsin.

#### You Get MORE when you Get ALLIS-CHALMERS

You can benefit from Allis-Chalmers years of experience in pump manufacturing for all industries. The design and engineering skill resulting from this experience is at your service — you get special construction pumps that give top performance and low operating costs.

ing from this experience is at your service — you get special construction pumps that give top performance and low operating costs.

Allis-Chalmers industry-experienced engineers will help you select exactly the Allis-Chalmers pump to meet your needs, and Allis-Chalmers can furnish a complete pump unit—pump, motor, and control.



## **ALLIS-CHALMERS**

Check 1401 opposite last page.

OCTOBER 1957

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CESSING







This dual purpose truck can be used to move barrels or drums and also serve as a drain rack. Available in two styles—handles welded to frame or with detachable handles that can be pulled out to conserve floor space. One set of handles can serve any number of trucks. Sturdy welded construction. Free-rolling 8" roller bearing wheels. Weight approximately 90 lbs.

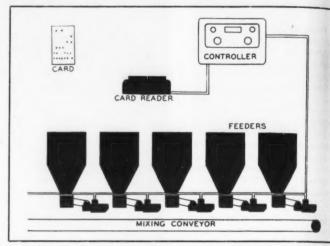


BOSTON, Mass., CO 6-0570 • BURLINGAME, Cellf., DI 2-0823 • CHICAGO, III., AUstin 7-8599 • CLEVELAND, Ohio, SU 1-3233 • DENVER, Colo., AL 3-3984 • PILNT, Mich., CE 8-681 • FORT WATNE, Ind., KE 6-608 • INDIANAPOLIS, Ind., ME 5-2587 • LOS ANGELES, Cellf., RA 3-3733 • MILWAUKEE, Wis., BRoadway 1-9860 • ST, LOUIS, Mo., PR 1-1474 • WHITE PLAINS, N. Y., White Ploins 6-1334

Check 1402 opposite last page.



MATERIAL



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If used

Typical blending control system uses punch card reader to transmit formula signals to actuators mounted on variable drive units controlling flow of feed from bins to mixing conveyors. Controller is needed only when "trim adjustical readerized only when "trim adjustical readerized."

### Continuous blending by punch card

- simple in operation
- accurate
- low initial cost

Uses: High accuracy formula control for continuous flow blending operations.

Features: System provides precision control but is simple in operation. It is primarily designed to operate from punch cards, but operation may also be from control panel containing "counter type" controls.

Only card reader and feeder or pump drives, with control actuators, are needed for most applications. System can provide formula accuracies of 0.1% without use of electronic components.

Control simplicity is obtained through use of binary digital system. Control actuator is mounted on top of variable speed drive unit. Actuator contains pilot motor and position-to-binary follow-up device. Card reader senses binary code appearing on punch card and signals pilot motor to adjust setting of transmission. Pilot motor is then instantly stopped through dynamic braking system included in card reader.

Speed drives can be completely explosion proof, and card reader or panel control can also be furnished in explosionproof enclosures.

Description: Formula card is punched for each multi-component formula that will be run. Cards are punched on simple mechanical, direct-reading card punch. To punch the card, desired percentage or rate of feed for first component is fed in punch counter. This establishes proper arrangement of 12 punches across card.

Card is then indexed and desired value for next component is fed into the counter. Formula card for 35 components may be prepared in less than two minutes.

When desired formula is to be run, card is inserted into reader. All feeders are set to proper feed rate simultaneously. At start of system, each feeder will begin to run in sequence — that is, second feeder will begin to run when product from first feeder on mixing conveyor reaches a position under second feeder, third feeder will start when material is under it, etc.

In this way proper blend is on conveyor at all times. When system is shut down, similiar sequence is followed —



Control actuator mounted on variable speed transmission has built-in position-to-binary follow-up device. System gives accurate control without use of electronic components

first feeder shuts down first, seconds shuts down when empty portion of conveyor reaches position under it, etc.

If a volumetric system is used where "trim adjustments" are needed to compensate for variations in component densities, a controller is added.

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CESSING

If closed loop control is preferable, everything remains the same except the control actuator which would not include the built-in position-tobinary follow-up device. Instead, a digital rate sensing device is mounted on output shaft of transmission.

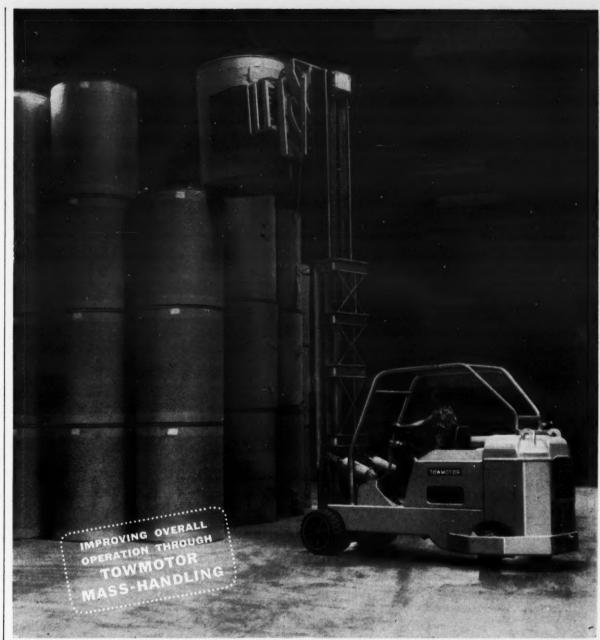
(Punch card control system is sold by Graham Transmissions Inc., Menomonee Falls, Wisconsin.)

Check 1403 opposite last page.



"Ahhh!, MMmm!, Boy Oh Boy! Now up a little and to the right a mite, Charlie. Mmmm!, Ah!, Wow!"

Cartoon submitted by Sherman L. Peeno, Procter & Gamble, Cincinnati.



#### lets one man handle work you'd pay a crew to do!

By putting new efficiency, safety and positive control into the hands of Towmotor lift truck operators you enable them to do a bigger day's work, easier. You let each one handle jobs you'd normally hire a gang to do.

Through modern Towmotor mass-

handling each operator has the power to improve your profit picture, because the new Towmotor fork lift trucks multiply their productivity. Look over the new features that operators like best about our latest models-such as:

- New planned-comfort design
- · Off-center adjustable seating
- · Double action hydraulic tilt
- Newly-improved power steering
  "3-second access" to engine
- · Famed 12" reach for all controls

Before you decide on your next fork lift truck, we urge you to get all the facts on the newly-designed Towmotor units. Write to Towmotor Corporation, Cleveland 10, Ohio today and ask for our new illustrated lift truck booklet - No. SP-23.

Leaders for 38 years in building Fork Lift Trucks, **Tractors and Carriers** 



Gerlinger Carrier Company, Dallas, Oregon, is a subsidiary of Towmotor Corporation

Check 1404 opposite last page.





Check 1406 opposite last page.



## UNLOAD...

hopper bottom cars

- quickly
- easily
- safely

and at low cost

Write for BULLETIN D showing how you can save up to 80% unloading sand, sulfur, ore, and other bulk chemical materials

NATIONAL CAR SHAKER

NATIONAL CONVEYOR & SUPPLY COMPANY 357 N. Harding Ave., Chicago 24, Ill.

Check 1407 opposite last page.

MATERIAL HANDLING

#### Rotary feeder holds pressure differences to 25 psi

Unit is designed for high pressures or vacuums

Uses: Feeding free-flowing bulk materials from hoppen and bins into processes.

Features: Eight-pocket periphery-sealed rotary feed. er operates at differential pressures to 25 psi. Design permits adjustment of floating Teflon seal-rings without dismantling unit.

Description: Available sizes are 4, 6, 8, and 10". Tips on rotor blades are available in nylon, Teflon, neoprene, rubber, stainless steel, or monel

(S.T.T. rotary feeder is manufactured by Beaumont Birch Co., Dept. CP, 1505 Race St. Philadelphia, Pa... or for more information check 1408 on form opposite last page.)

Nuts, bolts eliminatedversatile storage rack easily erected

Eliminates special racks and standardizes storage system

Uses: Interchangeable for storing pallets, skids, dies, or bulk, or for combinations of stored materials according to needs.

Features: Unit is assembled without bolts, nuts, erectionwelding, or special labor. One rack can be used to serve all storage needs without structural changes, since parts are interchangeable. All parts are reuseable at all times. Special rack installations are eliminated, and storage system can be standardized throughout plant.

Description: Adjustable storage racks are composed of three basic parts-upright frame, support beam, and floating wedge-lock. Racks can be loaded from either side. Supplementary parts permit multiple rack uses.

To erect rack, support beams are connected at each end to upright frames by slipping flat steel floating wedge-

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CESSING



Easily erected, adjustable storage rack completely eliminates special rack installations, permits standardization of storage system

lock through any pair of slots in upright, then through slots in support beam, applying pressure to lock it rigidly. Additional cross bracing or bolted parts are unnecessary. Once rack is completely assembled, it can be used in exactly the same way as any ordinary, stationary, non-adjustable storage rack.

Upright frame is available in five heights; 6, 7, 8, 9, and 10'— each 30, 38, or 44" in depth. Support beams, which are locked to upright frames anywhere, on 3" centers throughout the entire height, can be obtained in four clear widths: 46, 54, 90, and 106".

(Adjustable storage rack is product of Sturdi-Bilt Steel Products, Inc., 2501 Peterson Ave., Chicago 45, Ill.)

Check 1409 opposite last page.

#### Torque converter drive

Principles of hydraulic torque converter drive used in manufacturer's crawler tractors are outlined in four-page folder. MS-1233 — Construction Machinery Div., Allis-Chalmers Mfg. Co., Dept. CP, Milwaukee 1, Wis. Check 1410.

#### Vacuum cups adjust to handle various size sheets

Vacuum pump is mounted right in unit

Uses: Moving sheets of nonporous materials such as metal, glass, wood, plastic. Features: Four-cup unit is ANNOUNCING
an entirely new type of vibrating conveyor . . .
THE NATURAL-FREQUENCY AIRSLIDE!

developed by CARRIER Conveyor Corporation and the Fuller Company

## Conveys ultra-fine materials, plus lumps— <u>upward</u> as well as horizontally or downward!

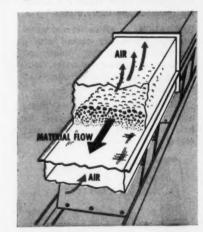
Now, for the first time, processors of finely-divided materials can take full advantage of the vibrating conveyor. The new Natural-Frequency Airslide, developed jointly by Carrier and the Fuller Company, combines the operation of a vibrating conveyor with that of an Airslide. As a result, it will convey even the most finely-divided materials, by themselves or in combination with lumps—horizontally or even upward!

And look at these other important advantages: The Natural-Frequency Airslide is completely dust-proof because it's completely enclosed. There is no loss of headroom, because it isn't necessary to decline the conveyor. Large chunks—or dust—or both, can be handled efficiently, rapidly. Maintenance and down-time are appreciably less than for any other type conveyor.

Here's bow it works: The rectangular trough of the vibrating conveyor is divided into two parts by a porous membrane. The upper portion of the trough is used to carry

the material, while the lower part is used as an air chamber. In operation, a small, non-critical amount of air is pumped into the lower chamber and passed through the membrane beneath the material being conveyed. In this way, air which would normally be pulled down through the conveyed material, is balanced. This air balance, plus the Natural-Frequency vibrating action, conveys the finest materials at speeds and in mat depths which actually exceed those achieved for coarse products.

Get all the facts — now. Write today to Carrier Conveyor Corporation, 204-A North Jackson Street, Louisville, Kentucky.



## CARRIER -NATURAL-FREQUENCY\* CONVEYORS

Check 1411 opposite last page.

## DARNELL

Always Always and ROCE

#### CASTERS AND WHEELS

for maximum
long life, minimum
maintenance



RUBBER TREADS . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

LUBRICATION . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Quick grease-gun lubrication provides easy maintenance.

STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.



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Consult the yellow pages of your helphone directory

#### DARNELL CORPORATION, LTD.

DOWNEY (IOS ANGELES COUNTY) CALIFORNIA 80 WALKER STREET, NEW YORK 13, NEW YORK 34 NORTH CLINTON STREET, CHICAGO 8, ILLINOIS

Check 1412 opposite last page

#### MATERIAL HANDLING



Lifter handles sheets made of non-porous materials

self-contained with vacuum pump integrally mounted. It is ready to hang from crane or hoist and needs only 110v connection to start operation. It is equipped with two crane lifting straps, enabling sheet to be lifted length- or widthwise.

Description: Cup centers are adjustable 14 to 24" front to back and 36 to 60" left to right Cups are individually valved with quick shut-off so that in event of breakage across one of them, other cups will not be affected.

Lifter is available with three size cups, 8, 10 or 14" diameter. (Model 1400V sheet lifter is manufactured by Vac-U-Mation Div., F. J. Littell Machine Co., Dept. CP, 4555 Ravenswood, Dept. 1-0, Chicago 13, Ill. . . or for more information check 1413 on form opposite last page.)

#### All-plastic pallets trays are rugged, easy-to-clean

High tensile and impact strength are achieved in line of plastic pallets, skids, shipping trays, and assembly-line trays. Surfaces are smooth, as



Complete line of plastic trays and pallets are available

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It will be sent to you without charge or obligation . . .

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CHEMICAL PROCESSING

111 EAST DELAWARE PLACE

If you are responsible for processing operations in an administrative capacity as plant superintendent, chemical engineer, chemist, engineer or equivalent responsibility . . . in a plant of substantial operations\* where chemical processing is an important factor . . . CHEMICAL PROCESSING will be sent to you without charge or obligation if you request it. Use form below. In requesting, be sure to answer all questions. If your firm is not rated or listed in standard references, indicate size of the company by capacity, annual sales or number of employees. Unless all information is given, magazine will not be sent.

\*"Substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

.....

CHICAGO 11, ILLINOIS	
Please send me CHEMICAL PROCESSING without charge or obligation	
Name	

Company

Rating of Company

Street \_\_\_\_\_\_ Zone \_\_\_\_\_

State \_\_\_\_

Main Products

there are no protruding nails, screws, or bolts.

Simplified load inventories are possible — pallets of a given type and size are uniform in weight. A 40 x 48 in pallet weighs only 23 lb.

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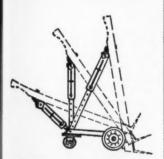
Features of plastic material include non-corrosion, no absorption of moisture or odors, easy cleaning and sterilizing. (Plastic pallets and trays are manufactured by Paltier Corp., 1701 Kentucky St., Michigan City, Ind.)

Check 1414 opposite last page.

#### Attaches to hand truck to ease handling of heavy loads

Fits any standard hand truck

Uses: Attaches to any standard hand truck for easier and safer handling of heavy loads. Features: Attachment installs simply to axle bar (with clamp furnished as part of unit) and to cross bar holding upright arms of hand truck.



Attachment installs easily to axle and cross bar of hand truck

Description: Attachment is adjustable in height. It is available in four basic types— light weight unit with single or double caster plate, for loads to 400 lb; and heavy duty unit with single or double caster plate, for loads to 2000 lb. Casters are installed with bolts to caster plate.

(Attachment is manufactured by Universal Hand Truck Attachment Co., Dept. CP, 633 S. La Brea Ave., Los Angeles 36, Calif... or for more information check 1415 on form opposite last page.) ARMOUR and COMPANY among thousands of users efficiently handling waste material with...



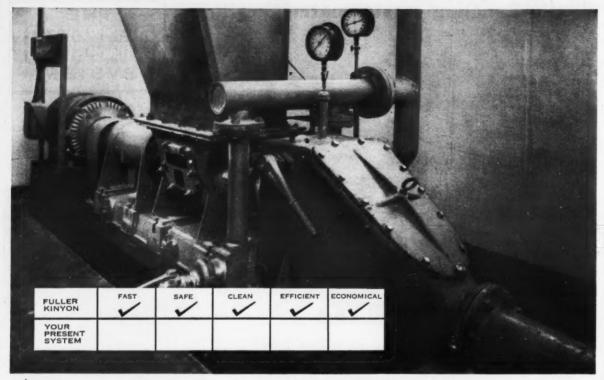


Also noted for its plant-wide cleanliness and sanitation, Armour and Company handles bulk materials at its Fort Worth operation with the aid of Dempster-Dumpster System. In addition to the fire hazards, the unsanitary waste material accumulation and collection with conventional methods, the high cost of handling constitutes a further problem for most manufacturers. Thousands of users like Armour and Company have found the Dempster-Dumpster System helps to solve all of these problems. Above you see how each big Dempster-Dumpster Detachable Container is serviced by the truckmounted Dempster-Dumpster, operated by only one man, the driver. At right you see other collection jobs handled at the Armour plant by a few of the hundreds of different designs and sizes of containers available. There is a Dempster-Dumpster Detachable Container available or that can be built to suit the material - be it solid, liquid, dusty, combustible, high temperature . . . waste or salvable, raw or finished product, and each, regardless of size up to 21 cu. yds. or capacity up to and over 36,000 lbs. payload, can be handled by one truck-mounted Dempster-Dumpster with only one man, the driver! Savings are tremendous! Write us today for complete information. Manufactured by Dempster Brothers, Inc.



DEMPSTER BROTHERS, 5107 N. Knox, Knoxville 17, Tennessee

### How many can't you check...



Fuller-Kinyon pump conveying flash-dried starch to dextrine or starch bagging department at rate of 12,500 lb. an hour. Conveying distance 600 feet.

#### ... against your present dry pulverized materials handling method?

If there's just one of these practical features that you can't claim, you can be sure that its lack is adding a substantial amount to your annual conveying costs. To move bulk Portland cement, pulverized coal, limestone dust, flue dust, fly ash, starch, pulverized phosphate rock or any other dry materials of similar consistency, a Fuller-Kinyon System designed specifically for your plant will provide the best combination of efficiency and economy available and also afford the "extras" of safety, speed and cleanliness.

#### \_A FULLER-KINYON SYSTEM:\_\_\_\_\_\_

- \*harnesses air to do the work
- \*eliminates fire and explosion hazards
- \*operates anywhere a pipeline can be run
- \*entails no complicated or costly installation factors
- \*reduces maintenance sharply
- \*can be operated by one man
- \*eliminates spillage-waste

Proof that these advantages have been long recognized is the fact that one or more Fuller-Kinyon Systems are serving in 98 per cent of the nation's cement mills as standard primary conveyors. Take a leaf from this service record. Get the facts as they apply to your plant and put Fuller's 30 years of pneumatic conveying experience to work for you.





### FULLER COMPANY 136 Bridge St., Catasauqua, Pa.

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION Chicago · San Francisco · Los Angeles · Seattle · Kansas City · Birmingham

Check 1416 opposite last page.

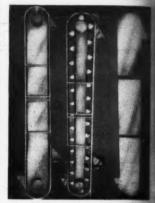
#### MATERIAL HANDLING

#### Five minute disassembly gives bucket elevator cleanliness, versatility

Uses: For elevating bullmaterials.

Features: Disassembled a five minutes, unit is easily maintained and cleaned. It can be rapidly adjusted to meet new operational requirements

Description: To disassemble bucket elevator, simply sno off spring clamps thereby removing doors. Belt and buck-



Versatile bucket elevator can be disassembled in five minutes

ets can be removed next. Unit is of all stainless steel construction, with neoprene bett and cover gaskets. Models are available with carbon-steel casing and chain-mounted buckets. Heights vary to 37 and capacities to five cfm.

(Bucket elevator is product of The Bucket Elevator Co., 300 Springfield Ave., Summi, New Jersey.)

Check 1417 opposite last page.

#### Describes conveyor belt

Bulletin explains design, construction, and use of conveyor belt engineered for small diameter pulleys. Conveyor Bul— The Main Belting Co., Divide Co., 157 E. Main St., Middletown, Conn. Check 1418.

For more information on product at right, specify 1419 . . . see information request blank opposite last page.

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#### No servicing costs on a clutch that isn't there

Here's the only truck of its kind with no-clutch driving as standard equipment. With this Clarklift, you eliminate expensive clutch replacement, repair and adjustment. Moreover, there's new operating ease... more efficiency from your drivers.

Engineered into the new Clarklift is a new transmission that delivers smooth constant power at the flick of a finger. The transmission for Clark's Hydratork Drive is designed for the stop-and-start operations of a lift truck. Operation is faster. There's less driver fatigue. Wear and tear on both truck and load is reduced.

You'll want to see this new *Clarklift* and its many dollar-saving benefits. Better still, ask for a demonstration on your property. No obligation. Write us or call your local Clark dealer—he's listed in the Yellow Pages.

Industrial Truck Division Clark Equipment Company Battle Creek, Michigan

Clarklift and Hydratork Drive are trademarks of





# for Chemical Processing Advertisers\*

The emblem at right is that of NBP-National Business Publications. You've probably seen it before on our contents page ... rate card ... or heading the CHEMICAL PROCESSING listing in Standard Rate & Data. Because we're proud of it.

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- Unbiased editorial content
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### **Chemical Processing**

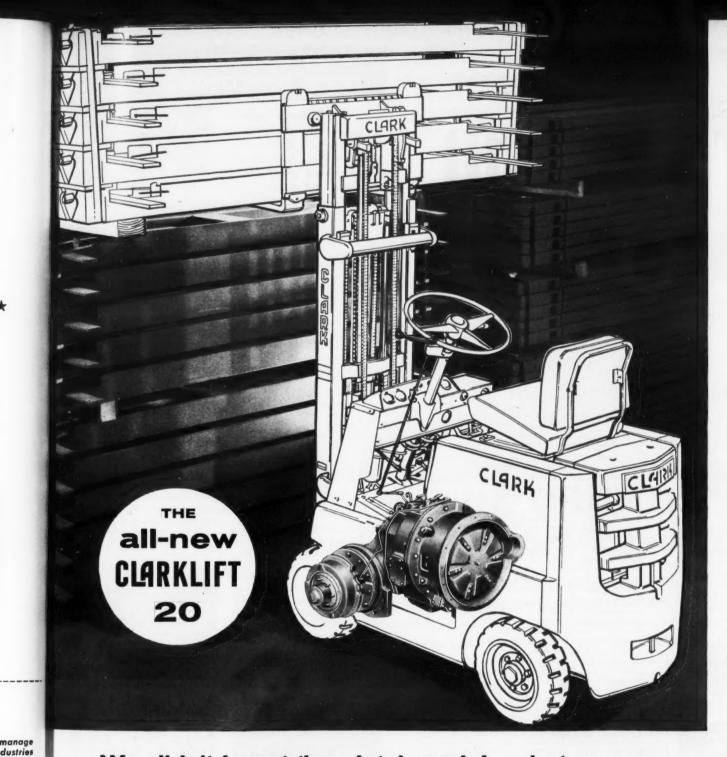
For men who manage the Chemical Processing Industries

**Published by Putman Publishing Company** 

Creators of PUTMAN-STYLE Magazines terie, vital editorial; "hand-picked" circulation; square, high-visibility format; quality readership; hence more READER ACTION







#### We didn't forget the clutch pedal . . . but you can

With the all-new *Clarklift*, you will never be bothered with clutch operation and adjustments. A single lever on the steering column controls all forward and reverse movement. *Hydratork Drive* takes over from there.

An efficient torque converter smoothly matches engine power to load. Constant mesh transmission, employing finest quality helical gearing, applies smooth even power. The most sensitive inching available is built into the *Clarklift's* transmission. There's smooth positive inching at all engine

speeds through a metering valve controlled by the brake pedal.

This drive has proven itself in thousands of units under all types of conditions. Your local Clark dealer can demonstrate this new *Clarklift*. Call him today—he's listed in the Yellow Pages.

Industrial Truck Division Clark Equipment Company Battle Creek 9, Michigan Clarklift and Hydratork Drive are trademarks of CLARK EQUIPMENT

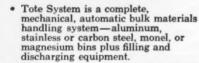
For more information on product at left, specify 1420 see information request blank opposite last page.



See our exhibit in Booth No. 990 at the 26t Exposition of Chemical Industries, Coliseum New York — December 2nd to 6th, 1957.

## TE SYSTEM

## offers unequalled ECONOMY and FLEXIBILITY



 Tote System more than pays for itself in a matter of months by (1) eliminating recurring container costs, (2) eliminating product loss, contamination and deterioration; (3) reducing labor and handling costs; (4) reducing warehouse storage space requirements; and (5) preserving original product quality.

 Tote System handles a diverse list of bulk products, including liquids, both in-plant and inter-plant.

 Tote System speeds up weighing and blending operations, accurately and automatically.

 Tote System—and only Tote—permits you to weigh incoming materials as a check against invoice weight and for a permanent inventory record.

 Tote System permits the use of a minimum, uncomplicated conveyor system with an accompanying reduction in clean-up and maintenance time.

 Tote System offers complete transportation flexibility. Tote bins can be shipped by rail\*\* or truck, or Tote Bins can be left in the plant and filled from hopper cars or trucks

 Tote System offers maximum flexibility to meet future conditions. Plant layouts can be changed easily by simply re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And Bins can be used interchangeably for different products.

 Tote System is prepared to furnish engineering and layout service, and can design and build specialized equipment to meet your particular needs.

Car Line Corporation and Tote System, Inc., the Container Car carries 28 Tote Bins. One man can unload the car in 35 minutes, using a lift truck. A mileage allowance of 3.2 cents is paid for every mile this car travels.

\* \*CONTAINER CAR

Developed by Shippers



\*Tote and Tote System, Reg. U.S. Pat. Off.

It will pay you to investigate Tote System. Let our engineers survey your plant at no obligation. Meanwhile, write for new catalog containing complete details, including some special applications and a partial list of users.

#### TOTE SYSTEM, INC.

680 SOUTH 7th, BEATRICE, NEBR.

Check 1421 opposite last page.

## LATEST INDUSTRIAL TRUCK DEVELOPMENTS

. . . in design, capacity, operating features, and accessories for improved performance and safety



#### First models . . .

. . . of manufacturer's newly established industrial tractor line are now available. Models have drawbar pull of 5000 and 6000 lb. Although these first two models are two-wheel-drive, future machines will include both two and four-wheel-steer, four-wheel-drive. Torque-converter drive

hp at 2200 rpm. Five-speed constant-mesh transmission fully utilizes high torque output from engine. Forward speeds range from 3.1 to 25.4 mph, and reverse at 3.1 mph. All-steel cab is offered as optional equipment. (Model TS-160 motor scraper is manufactured by Allis-Chalmers Mfg. Co., Tractor Group, Milwaukee 1, Wis.)

Check 1423 opposite last page.



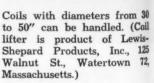
#### Coil lifters . . .

... have V-type decks to facilitate handling and lifting coils of various sizes. Complete line of all-steel constructed, hydraulic and electro-hydraulic models are available in range of capacities from 4000 to 20,000 lb.

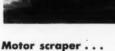


and automatic transmissions are featured. Head and tail lights are standard equipment. Wide variety of couplers are available. ("Paymover" tractors are manufactured by Towing Tractor Section, Frank G. Hough Co., subsidiary of International Harvestor Co., Libertyville, Ill.)

Check 1422 opposite last page.



Check 1424 opposite last page.



. . . features easy maneuvering, visibility, and speed for work in close quarters. Capacity is 7 cu yd struck, 9.5 cu yd heaped, 12-ton payload. Sixcylinder engine is rated 155

#### Platform walkie . . .

... for handling skid loads to 6000 lb has been redesigned to assure overall stability. Models are available in caYale & W. 87th Check

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pacity of 4000 lb with platform lengths to 54", and 6000 lb with length to 48". Minimum/maximum platform heights for two models are 6½/20" and 11/24½". Butterfly switch plate mounted on steering handle provides three speeds forward and three reverse. Brake is automatically applied and current cut off when steering handle is in either full "up" or full "down" position. (Hi-Skid Transporter is product of Automatic Transportation Co., Div. of Yale & Towne Mfg. Co., 149 W. 87th St., Chicago 20, Ill.) Check 1425 opposite last page.

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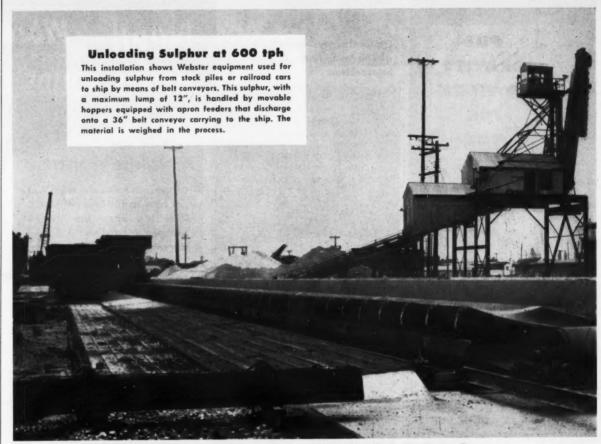
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. . platform truck transports loads to 4000 lb through confined aisles and crowded areas of terminals and warehouses. Simplified driving controls include throttle ring mounted within steering wheel, and hand-operated brake control bar forward of operator, below steering wheel. Steering ratios of either 1 to 1, or 3 to 1 are offered. Electric starting system, engine-hour meter, and padded operator support are included as standard equipment. ("Freighter" platform truck is manufactured by Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.)

Check 1426 opposite last page.



## MOVING BULK CHEMICALS is a job for Webster CONVEYORS



For many years WEBSTER has been providing ingenious solutions to material handling problems in the Chemical Industry.

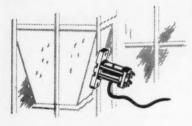
Whether your product be corrosive, abrasive, sticky or possesses some other problem-creating characteristic, WEBSTER Engineers can show you how to handle it most efficiently and economically. There is no obligation involved in discussing your problem with one of our Engineers—write us today.



Check 1427 opposite last page.



Gravity is the cheapest prime mover available. It will empty bins, convey materials, aid in transportation . . but it can't solve the problem of handling dry or viscous materials.



It takes the engineered application of Cleveland Vibrators to break up the frictional forces which cause adhesion and jamming. Vibration keeps materials moving in a full and controlled flow.

Cleveland Vibrators can be installed on all types of equipment for handling and processing chemicals. We will be happy to give you detailed data for your specific application, or a catalog for your reference files.

Air or Electric
Portable or Permanent
Silent or Standard



2706 Clinton Avenue • Cleveland 13, Ohio

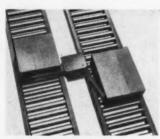
Check 1428 opposite last page.

#### MATERIAL HANDLING

#### Eliminates jam-ups at conveyor line intersection

Uses: Controls traffic on converging conveyor lines by automatically keeping material flowing from only one of two lines.

Features: Unit keeps lines free from being clogged, keeps material moving in an even



Device controls traffic on converging conveyor lines

flow, and speeds production, inspection, packaging, and shipping operations.

Description: Device gives right of way to package reaching intersection first, holding back other line until first package has cleared. Ideal operation is on packages weighing 20 lb or less.

(Fergo-Merger traffic control is manufactured by Harry J. Ferguson Co., Dept. CP, Jenkintown, Pa. . . . or for more information check 1429 on form opposite last page.)

#### Pantleg chute diverts flow

Flop gate can be manual-, chain-, or air-operated

Uses: Attaches to duct work, screw conveyors, and bucket elevators to divert stream of material from one direction to another.

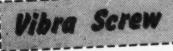
Features: Unit can be completely removed for cleaning. Optional at extra cost is lucite side to view actual operation of flop gate and flow of material. Flop gate can be worked manually through a tilt bar, by chains, or by air.

Description: Standardized

## New! Vibra Screw. METERS SOLIDS LIKE LIQUIDS

## with unparalleled accuracy!

- ★ Continuous flow rates from 1 oz. per hour to 100 tons per hour
- ★ Dust-free operation without bridging or flooding
- ★ Accuracy with simplicity and ruggedness-unhindered by dust, dirt or corrosion
- ★ Handles all materials, sticky or free-flowing—powders or pellets



P.O. BOX 62, WILLISTON PARK, N. Y.



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Low cost Pilot - Laboratory model now available!

Territories Open For Manufacturers' Representatives Write to Dept. "C" for latest bulletins

Check 1430 opposite last page.

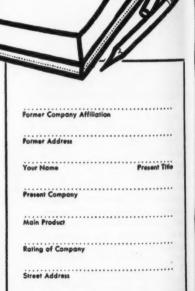
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#### BE SURE TO LET US KNOW!

your address you'll want to make sure that your copy of CHEMICAL PROCESSING continues to reach you . . . just use this convenient form.

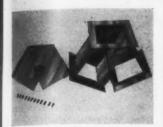
Please answer all the questions as completely as possible.

Mail request to Reader Service Dept. Chemical Processing 111 East Delaware Place Chicago 11, Illinois



186

City Zone No. State



Pantleg chute is available with lucite side to view flop gate operation and material flow

k Registered

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SSING

pantleg chute is obtainable in nominal sizes of 6, 9, 10, 12, 14 and 16", with corresponding dimensions for opening, flange center distance, and height.

Positive operation of flop gate is insured by rigid fastening of blade to shaft. Flop gate blade may be centered to divide flow equally in two different directions.

(Buck-El pantleg chute is manufactured by the Bucket Elevator Co., Dept. CP, 360 Springfield Ave., Summit, N.J. ... check 1431 on form opposite last page.)

#### Chain catalog

Manufacturer's line of conveyor, elevator, and power transmission chains is shown in eight-page catalog. Method of installing chain is described, and chain attachments are identified. Chain cat — Moline Malleable Iron Company, Dept. CP, St. Charles, Ill. Check 1432.

#### FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

## For smooth, surge-free flow of materials ...choose LINK-BELT Oscillating Conveyors



PELLETIZED IRON ORE is discharged from furnace to 36-in. wide Link-Belt Torqmount oscillating conveyor. This heavy-duty conveyor is for capacities to 100 tph and over.



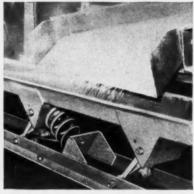
DAMP, STICKY ROOFING GRANULES flow smoothly from mixer to dryer on this Flexmount oscillating conveyor. "Positive Action" oscillation assures continuous, uniform flow,



GLASS CUTTINGS from car and truck windows are handled efficiently and safely by space-saving, under-floor oscillating conveyor. Metal troughs resist abrasive wear.



CRUSHED CALCIUM CARBIDE—as hot as 1700° F—is no problem for Torqmount oscillating conveyor at this plant. It's enclosed to confine dust, prevent entrance of moisture.



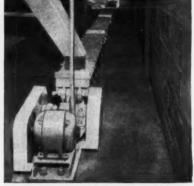
LIMESTONE and other materials containing dust or lumps the width of the conveyor trough are handled with minimum power demand on Coilmount conveyors.



THREE GRADES OF SALT are carried simultaneously by each of two partitioned Link-Belt Flexmounts. Deep, one-piece metal troughs are leak-proof . . . prevent spillage.



BAUXITE SINTER up to 300° F is carried on 36-in. wide heavy-duty oscillating conveyors from coolers to silos at 105 tph. Conveyors are spring mounted, dynamically balanced.



CORN PRODUCTS at a food plant are prewarmed as they travel in these insulated conveyor troughs. Self-cleaning troughs aid sanitation . . . prevent material buildup.

Sharp abrasives to delicate flakes . . . sticky granules to free-flowing powders—these hard-to-handle materials and many more are carried effectively on Link-Belt oscillating conveyors. Their positive action smooths out surges—assures uniform, continuous feed even under sudden overloads. It's combined with natural frequency to minimize power requirements.

Your nearest Link-Belt office can give you full details. Or write for Book 2644 on Coilmount and Book 2444 featuring Torqmount and Flexmount types.



LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.



You can save time and money with increased safety by installing a Cesco Skip-Hoist Dumper. Lifts, upends and dumps 100 loads per hour with a lifting capacity range from 100 to 1500 lbs. Single and multi-purpose portable models in standard heights from 6 to 10 ft. Stationary models to 20 ft. Easy, safe operation from push button con-

trols speeds up material handling and

MECHANICALLY!

eliminates accidents.

ESSEX CONVEYORS, INC. 165 Franklin Avenue, Nutley 10, N.J.

Write for complete catalog . . .

COLSON EQUIPMENT & SUPPLY CO. 1317 Willow Street, Los Angeles 13, Californi

CESCO≝DUMPERS

Check 1434 opposite last page.

#### MATERIAL HANDLING

#### Conveyor turntable adjusts to handle various size loads

Uses: Inserted in wheel conveyor line, turntable diverts skids, platforms, and packages at various angles.



Wheelrails mounted on top of turntable are adjustable

Features: Wheelrails mounted on top of unit may be moved apart or brought together by loosening and tightening adjusting nuts.

Description: Turntable 40" in diameter and 36" high. There is a manually-operated spring-loaded stop at the 90° points.

(Turntable is manufactured by Sage Equipment Co., Inc., Dept. CP, 30 Essex Street, Buffalo 13, N.Y. . . . or for more information check 1435 on form opposite last page.)

#### Conveyor belt service

Service for repairing and rebuilding large conveyor belts is described in eight-page bulletin. Feature of bulletin is section that tells and shows how belting is rebuilt. Conveyor belt service bul - Conveyor Belt Service, Inc., Dept. CP, 705 Sixth Ave., North Virginia, Minn. Check 1436.

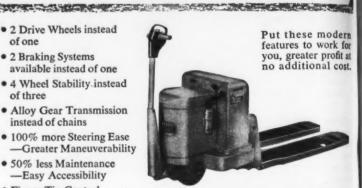
#### **Automated** conveyor saves work, time in heavy handling

Uses: For various applications such as moving heavy rolls, skids, pallets, and other

#### A modern truck for modern plants The Hydro Lectric

with most modern features

- 2 Drive Wheels instead of one
- 2 Braking Systems available instead of one
- 4 Wheel Stability instead of three
- Alloy Gear Transmission instead of chains
- 100% more Steering Ease -Greater Maneuverability
- 50% less Maintenance -Easy Accessibility
- Finger-Tip Control -Greater Safety



Write for Bulletin KP



STUEBING Designed . Engineered . Built

/ CINCINNATI 14, OHIO



THERE IS A TRUCK FOR EVERY PURPOSE TO HANDLE ANY KIND OF MATERIAL. Check 1437 opposite last page.

#### Neff & Fry Bin Being Erected for Handling Silica Sand

When photographed, this Neff & Fry Super-Concrete Stave Bin was being erected for the Ottawa Silica Co., Ottawa, Ill. It is the first of two

28' x 40' bins which are now completed and in use. Silica sand is supplied principally to glass manufacturers, foundries, and concrete producers.

Through our experience in building thousands of bins, we have mastered the techniques of handling and storing virtually all kinds of flowable bulk materials. This knowledge is at your service upon request. You are invited to communicate with us.

To understand the special advantages of our unique type of construction, ask for our folder, "Bins with the Strength of Pillars."

NOT EXPORTED EXCEPT TO CANADA AND MEXICO.

THE NEFF & FRY CO. • 166 Elm St., Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS

Check 1438 opposite last page.

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Gran Chec

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Turntables of automated conveyor system load, unload, or change direction of heavy loads

heavy loads.

e modern to work for ter profit at

ional cost.

Features: Powered electrically, all controls, conveyors, and turntables can be adapted to variety of applications where banding, tying and similar operations are now being done manually. One operator can handle entire operation that formerly required much manual effort.

Description: Automated conveyor system consists of series of support rollers, on which powered conveyor belt travels, with turntables for loading, unloading, and changing direction. System is mounted into floor, flush with floor level. It is prefabricated, with straightaways built in varied lengths, to eliminate extensive installation problems and costs. Support rollers can be easily removed without removing conveyor belt. Controls are centrally located, and system is supplied complete with all wiring, control boxes, and operation controls. Automatic weighing and recording are optional equipment.

(Automated conveyor system is product of The Engineering Products Co., Inc., 122 S. Michigan Ave., Chicago 3, Ill.) Check 1439 opposite last page.

#### Ball-transfer featured

Details of tables, stands, and mounts are shown in two-page bulletin featuring company's non-clogging ball-transfer unit. Construction advantages of unit, which make it acceptable for operation where mild acids, alkalies, oil, sand, and grit are encountered, are pointed out. Bul CP — Metzgar Conveyor Co., 412 Douglas St., N.W., Grand Rapids 4, Michigan.

Check 1440 opposite last page.



## HERE'S LOADER MOBILITY... EXCAVATING STRENGTH

LOADS  $1\frac{1}{2}$  CU YD AT A PASS . . .  $2\frac{1}{4}$  yd with light materials bucket. Lifts up to 11,200 lb.

WORKS RIGHT UP ON A STOCKPILE where wheels dig in. Can build stockpiles higher, store many more yards of material in a given area.

TURNS IN ITS TRACKS . . . where many smaller loaders have to jockey.

DIGS INTO HARD-PACKED MATERIAL . . . exerts 20,000-lb break-out force, with 72 net engine hp and modern bucket design.

These are just four examples of how an Allis-Chalmers HD-6G tractor shovel offers a combination of strength, traction, flotation and mobility that enables it to replace a fleet of part-time specialized machines. You can count on it to boost production indoors or out, the year round. Ask your Allis-Chalmers dealer about the HD-6G... also the three larger tractor shovels with capacities up to 4 cu yd. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

#### **ALLIS-CHALMERS**

Engineering in Action

Check 1441 opposite last page.

ESSING

MOVES GRANULAR OR WET MATERIAL NOISELESSLY

The simplest, most quiet answer for moving materials in hoppers, chutes and bins. One moving part, no lubrication, no maintenance, never harms the equipment on which it is mounted. Instantly self-starting every time. Vibrolator is the only vibrator that can guarantee this regardless of operating conditions. Write for catalog. You will also receive form for describing your problem. No obligation!



#### **VIBROLATORS®**

OVibrolator is a registered trade name and applies only to the pat-ented Peterson Vibrolator.



ENGINEERING COMPANY

155 KEMP ST. NEPONSET, ILL.

Check 1442 opposite last page.

THE NEW WAY TO DISPERSE. EMULSIFY and BLEND

#### **Particle Control** with a GAULIN Homogenizer

What's the best method to disperse, emulsify or blend? It's all in Particle Control. No single piece of equipment will satisfy all require-ments, so Gaulin offers three designs.

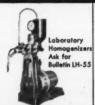
Homogenizer works at high pressures, uses fremendous velocity and energy gradients to create extreme concentrated turbulence to produce more uniform, stable emulsions and dispersions.

Sub-Micron Dispersor handles pigments and other abrasive dispersions. S-M-D Valve uses the same hydrokinetic principles as Homogenizer to produce dispersions of ultimate fineness.

RE\* Colloid Mill is a highly advanced, twostage designwhich provides continuous micrometer control for producing superior emulsions or dispersions. Operation is greatly simplified, maintenance negligible.

Laboratory Homogenizers and Colloid Mills are available on rental basis. Use them to explore the dramatic new Gaulin dimension of Particle Control.

Particle Control plus GTA — Gaulin Technical Assistance — is the key to new savings, better quality in your processing.







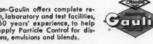
mogenizers and Sub-Micron Dispersers

The G.T.A. Library of

tion , , , your best source for a low-

Ask for Bulletins H-55 and SMD-55. Ask for GTA and Fortechnical data on Homogenizers the Gaulin Library and Sub-Micron Dispersers — Ask of Product Informa- for Bulletins H-55 and SMD-55.

Manton-Gaulin offers complete research, laboratory and test facilities, plus 60 years' experience, to help you apply Particle Control for dis-persions, emulsions and blends.



MANTON-GAULIN MANUFACTURING COMPANY 55 Gerden St., Everett 49, Mass.

Check 1443 opposite last page.

#### PACKAGING and SHIPPING



Heat-sealed polyethylene liner completely protects acrylic plastic material against moisture and other contaminates

Rohm & Haas has realized five advantages from their choice of polyethylene liner for bulk container shipment of acrylic powders. Through tests, they found that ...

### plastic protects plastic

... from moisture and dusts during shipment

Problem: Maximum protection of their Plexiglass acrylic molding powder during shipment to customer was sought by Rohm & Haas Co. Very small amounts of moisture or contaminates can cause surface defects and internal turbulance or bubbles in molded acrylic plastic parts. These defects are troublesome in both clear and translucent acrylic.

Company was using polyethylene-coated paper bag liners to protect powders shipped in 1000-lb containers. These stitch-closed liners were not satisfactory, since they could not provide 100% protection against moisture and gave an inadequate seal against contaminants.

Solution: Gusseted liner made entirely from 3-mil polyethylene film was adopted. Liner was developed by company's package engineers after number of different materials had been tested for strength, vapor barrier efficiency, and ease of handling. When final selection was made, tests were performed in 200-lb fiberboard drums before standardizing liner for 1000-lb packs.

To fit the bulk container, liner is designed with gussets provided in its sides. Gussets let liner expand into corners of square container without stretching or distortion.

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(Liner: Vis-a-1 Beverly Check

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During packaging operation, individual liner is placed in container with top stretched over container's edges. During filling, steel cover is placed over container. Material flows down polyethylene sleeve into opening in steel cover. Liner is then heat-sealed across top, and bulk pack is closed.

The 3-mil polyethylene liner has also been standardized for 200-lb fiberboard drums. In this case, they use a gusseted, perforated, continuous-roll liner of type now widely used in food-packaging industry. This liner is not heat-sealed but is closed with sealing disk of polyethylene laid across top chime of drum and sealed by drum's cover.

Results: Thanks to the liners, maximum protection is now provided to the molding powders during shipment.

Rohm & Haas lists five advantages for the liner:

• vapor barrier properties minimize moisture pick-up by acrylic material

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Gussets

corners

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- heat-sealing eliminates stitching and minimizes possible contamination by dust and other foreign particles during shipment
- material costs are comparatively low
- easy fabrication into gusseted bags
- polyethylene material contains no plasticizer which could cause contamination by migration.

(Polyethylene liners are supplied by General Packaging Co., 1003 Walnut St., Chester, Pa.)

Check 1444 opposite last page. (Liners are also supplied by Vis-a-pac Co., PO Box 326, Beverly, N.J.)

Check 1445 opposite last page.

#### Disposable cylinders

Bulletin of two pages describes disposable cylinder for handling Freon and other aerosols and compressed gases. Bul DC-257 — Tube Manifold Corporation, Dept. CP, 415 Bryant St., North Tonawanda, N.Y. Check 1446.

# What is the <u>exclusive ingredient</u> that makes Continental steel containers tops for quality and sales appeal?





experience - to work for you. It's the one big

difference in steel containers today. Call soon.

Eastern Division: 100 E. 42nd St., New York 17 

Central Division: 135 So. La Salle St., Chicago 3 

Pacific Division: Russ Building, San Francisco.

Check 1447 opposite last page.



## rugged

for extra protection



Valuable foodstuffs and chemicals deserve special protection. You can provide it by specifying VISQUEEN "L" film for drum and carton liners. Stronger, tougher and as pin-hole free as a polyethylene film can be. Economical, too. Perfect for shipping foodstuffs, corrosives, acids, adhesives, other difficult products.

film is all polyethylene, but not all polyethylene is VISQUEEN. Only VISQUEEN film has the benefit of research and resources of VISKING Company.

PLASTICS DIVISION VISKING COMPANY P.O. Box 1410 Terre Haute, Indiana In Canada: Visking Limited,

Lindsay, Ontario.

Division of UNION CARBIDE

Corporation

Check 1448 opposite last page.

#### PACKAGING

#### Leakproof steel drum has screw-type closure

No need for ring clamp

Originally designed for the Air Force and now being



Steel drums are leakproof

made available to industry are steel drums featuring something different in closures. These drums have twist-type closure that is leakproof and eliminates need for ring clamps.

Two sizes are now available 13.8" ID x 14" inside height and 13.8" ID x 19.5". There are plans to extend to all standard sizes up to and including 55-gal size.

(Twist Lock steel drums are available from Wraps, Inc., Dept. CP, 853 Broadway, New York 3, N.Y. . . . or for more information check 1449 on form opposite last page.)

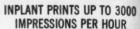
#### Photoelectric relay

Bulletin of two pages describes applications and operation of photoelectric relays made without amplifier tubes. Maximum operating distances are listed. Bul RP, Section F - Photobell Co., Inc., 43 Vesey St., New York 7, N. Y.

Check 1450 opposite last page.

#### Packaging, handling data

Results of research performed by government laboratories, or by other research facilities under contract to government agencies, and German docu-





AUTOPRINTER INDUSTRIAL'S

For production line marking, dating and coding of multiwall bags, cartons and bulk containers.

When dependable output must be coupled with flexibility and rapid changeover, it's a perfect job for Industrial's Autoprinter.

Completely automatic and electronically controlled, the Autoprinter works right with your production line ... at speeds up to 3,000 neat, legible impressions per hour regardless of surface variation! Saves inventory, pre-printing, storage costs. Uses interchangeable rubber type, requires minimum of attention. The Autoprinter has been engineered and built for effective performance . . . and with proper care, will give you a lifetime of service.

other INDUSTRIAL units include:

The WHIPPET Marker®



The WHIPPET Marker - for auto-

matic low cost conveyor line marking.



for automatically marking any material that takes hot dye transfer im-

SPECIALS-Our Specialty. We make and supply all types of special marking equipment, custom designed and built for your individual needs.

Write for complete details and new catalog today! Dept. CP



454 BALTIC STREET BROOKLYN 17, N.Y.

INDUSTRIAL MARKING EQUIPMENT

Check 1451 opposite last page. CHEMICAL PROCESSING and built

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MAIN 4368

t page.



#### For Your Products

Among the wide range of shapes, sizes, closures, and colors we now produce, there's one that will fit your needs—without mold costs.

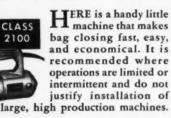
Jewel-colored Clearsite containers are moisturetight, dust-proof, easy to multi-color print. Because they are shatter-proof, they minimize breakage cost —their light weight means lower shipping charges. For full details address Dept. G.



### CELLUPLASTIC CORPORATION Sales and Executive Offices • Newark, N. J.

Check 1452 opposite last page.

#### NEW! Portable Electric Bag Closing Machine



**LIGHTWEIGHT**—9½ pounds. Carry it anywhere. No installation; requires only an electrical outlet.

POWERFUL—Direct drive motor with thumb control button. Exclusive top and bottom feed for greater power and production.

**VERSATILE**—Closes bags made of cotton, burlap, jute, multiwall paper, laminated paper.

SAFE—Anyone can operate it. No special training required Comes with shoulder strap or can be obtained with overhead suspension. Send for descriptive literature.

#### Union Special MACHINE COMPANY

Originator of Filled Bag Closing Machines

442 North Franklin Street

OCTOBER 1957

Chicago 10, Illinois

Check 1453 opposite last page.

ments captured in World War II are included in catalog of 118 technical reports in field of packaging and materials handling. To obtain Cat CTR-72 "Packaging and Materials Handling, 1941-57", remit 10c direct to Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.

#### Polyester film is heat-sealable

1-mil film can be laminated to paper

Uses: For light packaging jobs where moisture, oil, or odor retention is required.

Features: Film is clear and is heat-sealable on one side.

Description: Film has tensile strength of 10,000 psi with burst strength (Mullen test) of 32 psi. Elongation is 200% at break.



I-mil polyester film is heat-seal-

It can be laminated to paper without heat damage to paper fibers. Protected paper can be written on with wax or marking pencil. Film retains its properties through temperature range of  $-70^{\circ}$  to  $230^{\circ}\mathrm{F}$ .

It is presently available in widths up to 19" and roll lengths of 1500 yd.

("Scotchpak" film No. 10A3 is manufactured by Minnesota Mining and Mfg. Co., Dept. CP, 900 Bush St., St. Paul, Minn. . . or for more information check 1454 on form opposite last page.)

## Protect your profit margin



MODEL 4204

1:13 seconds per weighing

with fast, modern

#### SHADOGRAPH Scales

For Laboratory work — Production checkweighing — Centrifuge balancing — Batching — Compounding.

CAPACITIES — from 2,000 milligrams with 1 milligram visible sensitivity up to 100 lbs. with 1/4 ounce visible sensitivity. Available in avoirdupois or metric dial and beam.

Most SHADOGRAPHS available with explosion resistant features for use in locations where scales must comply with safety regulations.

SHADOGRAPHS weigh accurately in out of level positions. 1:1 ratio lever system unaffected by normal machinery vibration.

Short lever fall — adjustable hydraulic dashpot gives increased speed and reduces wear at points of contact. Long, useful life with minimum service.

SHADOGRAPHS available with crystal photocell controls for operating visual and audible signals, or controling auxiliary machinery or equipment.

Write for literature Form 3333.



Sales and Service Coast to Coast



#### THE EXACT WEIGHT SCALE CO.

905 W. FIFTH AVE., COLUMBUS 8, OHIO In Canada: P.O. Box 179, Station S, Toronto 18, Ont. BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 1455 opposite last page.



#### SIMPLE ARITHMETIC IN PACKING

Gaylord Boxes

CORRUGATED AND SOLID FIBRE BOXES FOLDING CARTONS • KRAFT PAPER AND SPECIALTIES KRAFT BAGS AND SACKS When one large box does the work of several smaller ones... it adds up to savings in many directions. You pack your product faster, handle it more efficiently and store it in less space.

"King-size" Gaylord boxes are designed to hold as much as 2,000 pounds of such diverse products as bulk chemicals, metal parts, wax, and brake linings. The list is constantly growing. Your product could be next.

For any type of corrugated or solid fibre container to make your shipping more efficient, contact your nearby Gaylord office.

GAYLORD CONTAINER CORPORATION \* ST. LOUIS

Check 1456 opposite last page.



PACKAGE IDEAS

Latest developments in packages and their design

Gay colors flower motif . . .



ing tip. Oil tube is white overprinted with green bars, and bears Texaco name and star in red. Grease tube features trade name and signature in white "T" area, against dark green background. (Coated polyethylene tubes are manufactured by Bradley Container Corp., subsidiary of American Can Co., Maynard, Mass.)

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Check 1458 opposite last page.

. . adorn new line of round, plastic-coated paper containers adopted by KAPCO Div. of Summers Fertilizer Co. New type containers come in three sizes and may be opened and closed easily due to specially designed slip-on cover. Convenient features offered by new style containers used for plant foods and fertilizers has been met with popular acceptance. (Plastic-coated paper containers are manufactured and designed by Sealright Co., Inc., First & Fay St., Fulton, N. Y.)

Check 1457 opposite last page.

Squeeze-tube oil or grease . . .

. . . for outboard motors has been adopted by Texaco. Polyethylene tube has inner coating to prevent oils from bleeding through walls. Easyto-keep-clean e i g h t-o u n c e tubes have elongated dispens-



Eye-catching box . . .

. . has been designed for Jewel Tea's Won detergent. Corrugated carry-home box features four-color printing red, black, light and dark green. Special die-cut handle facilitates carrying. Convenient tear tab makes it easy to open. Glassine-lined for additional product protection, containers hold 71/2 lb. of detergent and are packed six to master unit for shipment (Designed and produced by Hinde & Dauch, Sandusky, Ohio.)

Check 1459 opposite last page.

16-ounce size . . .

. . is latest in line of ovalshaped polyethylene bottles Production of this new size makes polyethylene ovals now available in ranges from %-a through 16-oz capacity. Development of pint oval is to meet growing demands of drug, toiletry, and pharmaceutical industries; and for other industrial applications where consumer is requesting larger and more economical sizes. Borden Company's Chemical Div. is first to adopt new size container for their line of fast drying general

line of fast drying general Check
CHEMICAL PROCESSING OCT

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shipment. oduced by

e of ovale bottles new size ovals now from %-02 acity. Deoval is to mands of pharmaand for pplications s requeste economi-Company's

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purpose glue. (Sixteen-ounce oval-shaped plastic bottle is product of Continental Can Co., Plastic Container Div., 2930 N. Ashland Ave., Chicago, Ill.)

Check 1460 opposite last page.

#### Aerosol shaving mug...

.. retaining attractiveness of the soap-and-brush repository of yester-year was developed to demonstrate adaptability and versatility of aerosol con-



Conceived primarily as a show piece, mug bears individual gold monograms designed by a New England antique artist. ("Aero Mug" is product of Aerosol Techniques, Inc., 111 Silliman Ave., Bridgeport, Connecticut.)

Check 1461 opposite last page.



Important News

from VULCAN:

We are now making drums

Repeat: We are now making DRUMS

Repeat: We are now making

DRUMS

...in addition to our complete line of steel pails and tin plate cans! Call, wire or write for complete information:

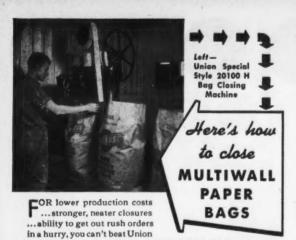


BELLWOOD, ILLINOIS

Chicago phone: MAnsfield 6-7660 Long Distance: LInden 4-5000



Check 1462 opposite last page.



Special Bag Closing Machines! Specially built to stand up under heavy production schedules, these machines provide the high output rates needed to meet modern competitive conditions.

In the Union Special line, it's easy to find the right unit to meet your particular requirements. ASK FOR RECOMMENDATIONS.

#### SEND FOR THIS BULLETIN!

Get your copy of this 16 page illustrated bulle-tin containing helpful data and charts on the complete Union Special line of bag closing UNION SPECIAL MACHINE CO. machines. UNION SPECIAL MACHINE CO., 442 North Franklin Street, Chicago 10, Illinois

#### UNION SPECIAL

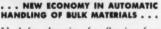
Check 1463 opposite last page.



CABLE-VEYOR\* ELEVATORS

offer a new

#### LIFT FOR YOUR PROFITS



Ideal for elevating free-flowing foundry sand, chemicals, foods, metal and plastic powders, gravel, coal, welding flux!

#### NEW DESIGN FEATURES CUT COSTS

Hi-Lift simplicity costs less to buy-less to operate. Far fewer parts than other elevators. No rivets, bolts, fasteners between buckets -long-lived flexible steel cable carries load.

Simple rubber-tired drive eliminates sprock-Various bucket styles. Three sizes . . . two speed ranges. Investigate-

WRITE TODAY FOR BULLETIN C-107 apman CONVEYORS, INC.

KALAMAZOO In British Commonwealth & Europe: Fisher and Ludlow Ltd., Birmingham

196

MICHIGAN

Check 1464 opposite last page.

#### PACKAGING

#### High speed tape machine - big factor behind Ajax's pre-punched lid

Problem: Biggest hurdle in Colgate-Palmolive's decision to change top design on Ajax can was development of machine to deliver taped prepunched lids at production line speeds. Only when this was accomplished could management make final decision to switch container design.

Solution: A white paperbacked tape met requirements - printable and able to stay on and yet be easily removed.



Machine turns out over 250 taped pre-punched lids per minute

Tape's manufacturer was called on to design a machine that would apply tape to lids at high speeds.

Result was a mechanical tape applicator capable of making over 250 applications per minute.

Machine takes untaped prepunched lids automatically from chain conveyor equipped with pusher cleats. Lids are automatically taped, inspected by photo-electric eye (which rejects imperfectly taped lids), and restacked in unloading

Tape is fed through a series of rollers which alternately stop and start hundreds of times a minute. Stop-start action is synchronized with tape-applying assembly to allow tab of tape to enter as instant applying-pad is preparing for next application.

As tape enters assembly, it is lightly creased in middle so that it will extend rigidly above lid.

In one swift movement, applying-head descends, sever-



Model 340 S.S. Construction Port Size—Sealed Ball earings—Mechanical Bearings-Mecha Shaft Seal

SIMPLE, COMPACT, ONLY ONE MOVING PART DURABLE NEOFREN

SELF-LUBRICATED TROUBLE-FREE

HERE'S another Jabsco industrial pump – designed and built for chemical, pharmaceutical and other industrial applications. Ideal for transfer of various liquids and acids – sump drainage, coolant pumping, general transfer, pulp in solution, filtering, brines, plating solutions – even fluids containing foreign matter or particles, silt, crystals, and other gritty materials. Bronze, stainless stell or plastic construction is available to solve your specific pumping problems. Pumps either light or heavy viscous liquids. FREE—liquids. Temperature ranges from send for cat uids. Temperature ranges from to 180° F. Write for a Jabsco fac-

PATENTED AND PATENTS PENDING tory recommendation for your own needs. Specify application, fluid pumped, temperature, pressure, etc.

send for cat-alog sheets, detailed no obligation

BSCO PUMP COMPANY

2031 Lincoln Street, Burbank, California

Check 1465 opposite last page.

## Announcing

the New Jerguson

#### MAGNETIC GAGE

For Liquid Levels

An important advancement in liquid level observation for plants with dangerous explosive or inflammable conditions.

- Safety design seals against escaping gases.
- Measuring mechanism in stainless steel cham-
- Scale mounted outside chamber; magnetically actuated through chamber wall.
- Distinct, accurate level shown in red contrasted with silver above.
- Job designed, correlating pressure, temperature, and specific gravity.
- For pressures up to 2500 lbs. @ 600° F.
- Can also be used for interface.

Write for folder on Jerguson Magnetic Gages.



Gages and Valve of Liquids and Levels

JERGUSON GAGE & VALVE COMPANY 100 Adams Street, Burlington, Mass.

Offices in Major Cities. In Canada: Peacock Bros. Ltd.

Check 1466 opposite last page.

CHEMICAL PROCESSING

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ing tape against stationary cutting blade. Tape is patted lightly to lid, which then moves on and passes under buffing roller to press tape down securely.

Lids are carried to filling and capping room where they are applied to filled cans.

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PANY

Results: Machine has enabled Colgate-Palmolive to market a container receiving wide acceptance. At the same time the company was able to maintain production machinery and schedule without costly revision.

Presently seven machines in four plants around the country meet daily production requirements.

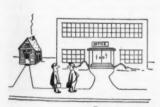
At one plant, only two men are needed to operate three machines.

("Scotch" brand No. 256 tape and tape applicator are manufactured by Minnesota Mining and Manufacturing Co., 900 Fauquier Ave., St. Paul 6, Minn.)

Check 1467 opposite last page.

#### Barrier materials evaluated

Report of 90 pages discusses permeability of barrier materials to volatile corrosion inhibitors at various humidities. Research conducted for USAF is basis of report. To obtain report PB 121893, remit \$2.25 direct to Office of Technical Services, United States Department of Commerce, Washington 25, D.C.

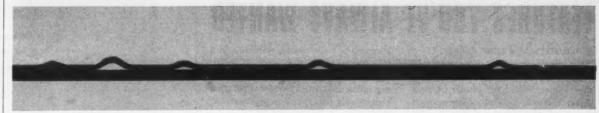


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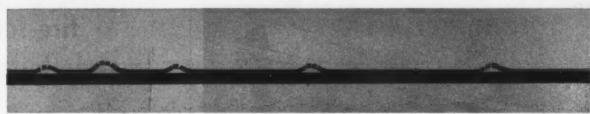
"Government contract."

Our thanks for this one goes to James V. Redding, The Central Pharmacel Co., Seymour, Indiana.

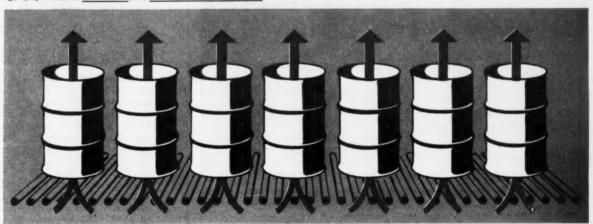
### Now! No trace of blisters or pinholes!



Globules of air or solvents can be trapped in lining material applied to steel drums by the air spray method. These expand under heat during the curing process.



Eventually, these blisters in the partially cured lining material break through, causing pinholes. This cannot happen with lining materials applied by the Rheem Centrifugal Spray Process as no air is used, and solvent content is vastly reduced.



And Rheem uniformly applied linings are properly cured by high temperature baking which insures even, free flow of warm air vertically through every drum.

New Rheem Centrifugal Spray Process gives you a completely uniform lining, drum after drum after drum!

All surface areas of a drum automatically lined by the new Rheem Centrifugal Spray Process are—and stay—completely and uniformly coated.

This new, fully automatic process not only eliminates globs and skips, but blisters and pinholes as well. And Centrifugal Spraying, teamed with the new Rheem Vertical Baking Process, results in a curing job never before equaled!

Only the new Rheem Centrifugal

Spray Process gives you: (1) Uniform lining thickness—controlled to within .1 of a mil. (2) Uniform viscosity of lining materials with lower solvent content. (3) Uniform application. There's no air turbulence because there's no air used in the spray and no drum rotation. Spray always travels the same distance to coat all surfaces. Human element eliminated. (4) Uniform curing—thanks to vertical, 3-stage ovens with controlled air flow and temperatures.

YOU CAN RELY ON

New Centrifugal Sprayer spins off a continuous curtain of finely atomized lining

material at a controlled, uniform rate.



WORLD'S LARGEST MAKER OF STEEL SHIPPING CONTAINERS

For full details write: Rheem Manufacturing Co. Container Division, 1701 Edgar Road, Linden, N. J.

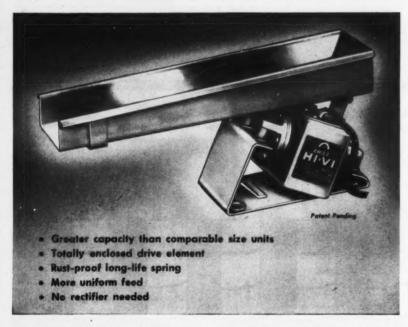
Plants and Sales Offices: Richmond and South Gate, Calif. • Chicago • Linden, N.J. • New York • Houston • New Orleans • Sparrows Pt., Md.

Check 1468 opposite last page.

SSING

## NEW HI-VI FEEDER BY ERIEZ HAS THE FEATURES YOU'VE ALWAYS WANTED

REVOLUTIONARY NEW CONCEPTS in mechanical design and construction materials produced this outstanding new feeder. Based on results of field research, these new units incorporate many of the features asked for by people who use feeders. Available in a wide range of sizes to meet all needs, Eriez feeders give you higher operating efficiency over broader operating ranges—let you move more materials faster!



NO RECTIFIER NEEDED! Just plug or wire in these new feeders; they operate at 3600 CPM directly off an AC line. No rectifier is needed, as a lifetime-powered magnet replaces this element by providing an automatic, inherent magnetic rectification system which is simple, trouble-free and highly efficient. All energy (a two-way push-pull vibrating action) goes for productive performance.

TOTALLY-ENCLOSED DRIVE ELEMENT: can't be

damaged or lose efficiency due to contamination by moisture or foreign materials.

DISC-SHAPED GLASS FIBER SPRINGS: rustproof, they're not subject to corrosion, "packing", fatigue or other critical characteristics of steel leaf spring systems.

GREATER OUTPUT CAPACITY: more work output than any other feeders of comparable physical size.

#### OTHER FEATURES INCLUDE:

Almost silent operation 

Rectangular-shaped tray bottom for more uniform feed 
Larger, more powerful Alnico V magnetic drive element 

Compact base for tandem, side-by-side or back-to-back installations 

Less sensitive to voltage change 

No "air gap" adjustment needed 

Units are lightweight, compact, easily Installed 

No sliding or rotating parts to wear 

Low power consumption, maintenance and operating costs

An Eriez Feeder provides accurate, controlled feed of bulk materials variable from ounces to tons per hour — automatically. Works well with all types of materials: hot, dry, dusty, lumpy, abrasive, etc. Conveys, spreads, agitates, separates, Blends, dries, cools and mixes—economically and in a minimum of space.

Only Eriez Feeders have HI-VI drive systems — powered by an Alnico V magnet that's permanent . . . will never wear out!



Interesting new booklet tells all about the Eriez line: For your free copy, write to Eriez Mfg. Ca., 73-XV Magnet Dr., Erie, Pa.

Check 1469 opposite last page.



SAFETY

Management and safety personnel at petrochemical plant recognized potential hazard in handling large quantities of highly flammable butadiene. Company obtains positive fire protection as . . .

## fire-fog water spray guards butadiene storage

THEODORE W. WETT, Assistant Editor

JOSEPH L. SHIFFLETT, Fire Chief
The Goodyear Tire and Rubber Co.,
Akron, Ohio

Problem: Butadiene, with a flash point of  $-50^{\circ}$ F, is a potentially dangerous material, particularly in the large quantities (storage for over 500,000 gallons) required in production of butadiene-styrene synthetic rubbers and latices at Goodyear Tire and Rubber's Akron, Ohio plant. Butadiene boils at 25°F and has an auto-ignition temperature of 450°F. The explosive limits are 1.2 to 11% by volume in air.

Need for a positive fire protection system in large butadiene storage and transfer areas was dramatically underlined during World War II when a plane crashed dangerously close to the area. Not only plant protection was involved, nearby residential areas also had to be protected from balls or trails of highly-flammable butadiene vapor should a spill or leak occur.

Solution: Storage a reas, loading docks, pump house, and stripping towers were fitted with an automatic firefog, water spray protection system. Two methods of actuation are used: Rate-of-temperature-rise detection quickly responds to abnormal increases in temperature that exist when fire occurs. Vapor detection system constantly

samples air in hazardous area and actuates an alarm when vapor concentration reaches a predetermined percentage of its lower explosive limit (50%). At a pre-set higher percentage (65%) the fire protection system is actuated.

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System employs spray nozzles to blanket area to be protected, with a water spray sufficient to control and extinguish fires or prevent fires by reducing concentration of flammable vapors. Nozzles are connected by means of hydraulically sized piping to a control valve which is actuated by either rapid rate of rise of temperature or vapor concentration detectors.

Pipes are sized and number of nozzles calculated to assure an adequate water supply for each area. For 150,000 gallon storage areas, 3200 gpm of water are delivered; 2700 gpm are delivered to a slightly smaller area; and 2000 gpm to loading stations. A 52 psi residual pressure is maintained at each nozzle. A 550,000 gal reservoir provides a two hour overall reserve supply of water for system.

Results: Fire-fog system provides positive protection against damage by fire in areas where butadiene is stored and transferred. In conjunction with vapor detection

Fire-fog completely blankets styrene stripping tower and butadiene storage tanks at Goodyear's synthetic rubber plant. System provides positive protection in areas when highly flammable material is stored and handled

system, large leaks or spills can be detected and handled before dangerous concentrations can develop and endanger plant or surrounding residential areas. Plant management is confident that every precaution has been taken to provide safest conditions possible in storing and handling highly flammable material.

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stant Editor Fire Chief Rubber Co.

Akron, Ohio

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(Fire-fog protection system was supplied by "Automatic" Sprinkler Corp. of America, Youngstown, Ohio.)

Check 1470 opposite last page.

(Vapor detection system was supplied by Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.)

Check 1471 opposite last page.



All portions of butadiene loading docks are covered by water spray.

System can be actuated either by quick rise in temperature or predetermined vapor concentration



## the resiliency of rubber.... ....the strength of steel

## An Unbeatable Combination against Corrosion, Abrasion and Erosion in Industry.

Rubber and Steel, wedded by experts with an adhesion of over 500 psi, offers a service and economy never dreamed of in the process industry 10 years ago.

Whether your needs involve conduction or storage, corrosive fluids from acids to alkalies, abrasive solids from finest powder to coarsest crystals, under vacuum or pressure conditions, find out what rubber and steel can do for you.



La Favorite
offers
40 years experience
in "growing up
with rubber"
as a basis
for help
and advice.

One of several rubber lined tanks for City of Baltimore water system to hold 30% fluosilicia acid.

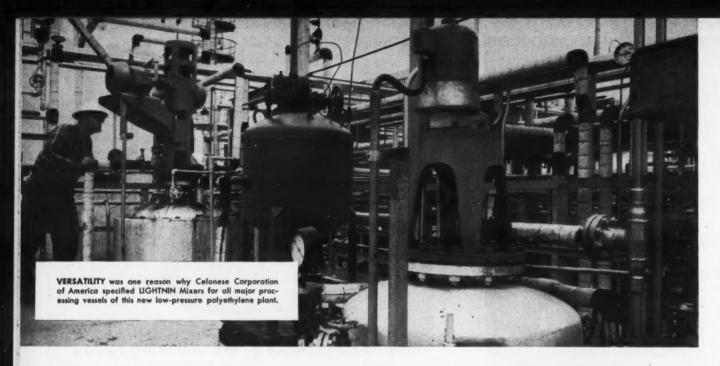
Call us now and reverse the charges, or send for bulletin 55, the complete story of La Favorite and its service.

## LA FAVORITE Rubber Mg. Co.

267 Wagaraw Road • Hawthorne, New Jersey

592

Check 1472 opposite last page.



#### Why Celanese chose these mixers for low-pressure polyethylene

How can mechanical mixers help you give the touch of success to an important new process?

Celanese Corporation of America faced this question when its Plastics Division designed a plant to produce 100,000 lbs./day of Fortiflex® lowpressure polyethylene.

#### **Needed: special answers**

"We looked for a mixer supplier who could provide special features required by our process," says Lonnie C. Cunningham, chief engineer at the new Celanese plant, Pasadena, Texas. "MIXCO engineers came up with a design that solves these mixing problems for us:

"1. The mixers had to be versatile, since they must suspend solids in liquids over a wide range of operating temperatures. Mixco's experience in our field and similar ones gave us confidence that their design would stand up in actual performance.

#### "No stoppage"

"2. Efficiency of the mixers means much to us, because any stoppage in our continuous process may cause troublesome settling and hardening of material in the tanks. The durable construction of LIGHTNIN Mixers is important in maintaining uninterrupted flow.

"3. Another factor in keeping this process onstream continuously is the LIGHTNIN mechanical seal on some of our pressure units. This seal prevents leakage, and requires practically no maintenance. When necessary, we can change the seal quickly without dismantling the mixer, without loss of product and without pulling specially skilled men off other jobs.

"4. Finally, MIXCO's price was competitive-even though their bid was not the lowest."

#### Getting the edge

You can give your new process economic advantages like these by calling in Mixco at an early stage.

You get onstream faster because Mixco can build the special-purpose mixers you need, using standard stock components.

You know you're right because your LIGHTNIN Mixers are designed on the basis of unique fluid mixing experience and technology . . . and backed by a guarantee of successful results.

You trim operating costs with mixer features like the LIGHTNIN mechanical seal, flex-protected gearing, and many

To see how you can get this efficient kind of mixing for your process, talk to your LIGHTNIN Mixer representative (you'll find him listed in Chemical Engineering Catalog). Or write us direct.

## htnin Mixers...

MIXCO fluid mixing specialists

MECHANICAL SEAL on this tur-bine-type LIGHTNIN Mixer at Celanese can be replaced in mi ng mixer and with out special skill.

WHAT MIXING OPERATIONS are important to you? You'll find a wealth of information on fluid mixing in these helpful bulletins describing LIGHTNIN Mixers:

Top or bottom entering; turbine, paddle, and propeller types: 1 to 500 HP (B-102)

Portable: 1/2 to 3 HP (8-108)

Side entering: 1 to 25 HP Laboratory and small-batch Top entering; propeller types: ¼ to 3 HP (B-103)

production types (B-112)

Condensed catalog showing all types (B-109)

Quick-change rotary mechanical seals for pressure and vacuum mixing (B-111)

Confidential data sheet for figuring your mixer require-ments (B-107)

Check, clip and mail with your name, title, company address to:

MIXING EQUIPMENT Co., Inc., 185-k Mt. Read Blvd., Rochester 11, N.Y. In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.



more information on product at left, specify 1473 see information request blank opposite last page.



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#### Long-wearing latex gloves

Curved-finger design gives pliability, comfort

Uses: For protecting hands from harmful chemicals, acids, and gases.

Features: Long-wearing gloves have curved-finger design and provide pliability and comfort under hard, continuous service.

Description: Made from liquid latex, gloves are available in variety of styles. Light, medium, and medium-heavy



Latex gloves provide pliability, comfort as well as protection

weights are furnished. Smooth and firmhold finishes are obtainable.

(Wil-Gard latex gloves are product of Industrial Div., The Wilson Rubber Co., Dept. CP, 1200 Garfield Ave., S. W., Canton 6, Ohio . . . or for more information check 1474 on form opposite last page.)

#### Monitoring systems keep legal record of radioactivity

Uses: For detection, recording, and warning of airborne particulate radioactivity.

Features: System provides permanent legal record of integrated radioactive dose.

**Description:** Radioactivity monitoring system is capable of detecting airborne particulate activities of from  $10^{-3}$  to  $10^{-10}~\mu$  c/cc. Maximum counting rate is 20,000 cpm. Counting chamber can be easily decontaminated.

(Radioactivity monitoring system are available from Nuclear Measurements Corp., Dept. CP, 2460 N. Arlington Ave., Indianapolis 18, Ind. . . . or for more information check 1475 on form opposite last page.)



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## Molded Hard Rubber proves best for....



ANOTHER CORROSION PROBLEM SOLVED BY LUZERNE

Above is shown a portion of a typical cell in Western Electric Company's Electroforming plant at their Point Breeze Works. This cell consists of a plastic lined metal shell with hard rubber weir plates fastened to each end. The feed weir shown is cored and connected to the electrolyte supply line by a flexible elbow.

Western Electric reports that a number of materials were considered for fabrication of these weirs and flexible elbows and it was concluded that hard rubber and neoprene provided the best combination of temperature stability, corrosion resistance, mechanical strength, ease of fabrication, and moderate cost.

Luzerne fabricates these hard rubber parts for Western Electric:—Luzerne can solve your corrosion problem too. Write for information on Hard Rubber Molded Products, or send your problem for analysis by our engineering department.



See LUZERNE EXHIBIT in BOOTH NO. 435



#### The LUZERNE RUBBER CO.

200 Muirhead Avenue

frenton, N.

Check 1477 opposite last page.

SAFETY

#### Thermal Insulation protects steelwork from fire damage

Material weighs only 12 lb per cu ft

Uses: For insulation of pipe, vessels, and structural steel.

Features: Insulation also provides protection for steel-work against damage from intense heat of external fires. Its light weight (only 12 lb per cu ft) makes it practical as covering for existing steel structures.

Description: Hydrous calcium silicate insulation has advantage of shrinking only slightly up to 1100°F. Completely immersed for 24 hours in test furnace at 1800°F, shrinkage was limited to about 1½%.

(Kaylo-20 is product of Owens-Illinois Glass Co., Dept. CP, PO Box 1035-1036, Toledo, Ohio . . . or for more information check 1478 on form opposite last page.)

#### Hydrofluoric acid safety

Booklet of 48 pages covers properties and essential information for safe handling and use of hydrofluoric acid (anhydrous and aqueous). This is first revision since 1948. Safety Data Sheet SD-25 — The Harshaw Chemical Co., Dept. CP, 1945 E. 97th St., Cleveland 6, Ohio. Check 1479.



"Just as I thought, Jones, you're not wearing your safety shoes."



thoroughly cleanse chemicals or foreign objects from eyes in precious seconds...seconds that may be the difference between permanent injury and good eye-sight! This safety equipment enables workers to self-administer pressure-controlled clear water to afflicted eyes. HAWS Eye-Wash Fountains were designed in cooperation with leading Safety En-

gineers...for split-second safety!

#### HAWS EMERGENCY DRENCH SHOWERS

deliver a sudden torrent of water to dilute and remove injurious acids or caustics from workers' bodies and clothes ... providing foolproof operation for every emergency. The cost of safety is negligible...with HAWS Emergency Facilities! Write today, for full details!

Note: HAWS also manufactures Drinking Fountains of all types; Electric Water Coolers; and KRAMER Flush Valves...for any type of plumbing fixture.

#### DRINKING FAUCET CO.

1439 FOURTH STREET (Since 1909) BERKELEY 10, CALIFORNIA

Check 1480 opposite last page.



Note there is a key number at the end of editorial articles or advertisements. To request more information check the proper number on the convenient form opposite the last page. Send the form to us . . . we do the rest. Information comes direct to you. No obligation, of course.

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#### fire extinguishing system effective on fluid metals such as sodium, NaK

System may be activated by heat-actuators or manually

Uses: Extinguisher is designed to give maximum protection against metal fires in areas where use of manual extinguishers is impossible because of radiation hazards or because of denser, caustic smoke characteristic of liquidmetal fires.

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Features: System is especially effective on fires in such liquid metals as sodium and NaK. Piped system may be activated manually or by heatactuating devices.

Description: Fire extinguishing system consists primarily of sodium chloride specially compounded with materials that are both waterrepellent and sufficiently freeflowing to be applied through piping systems and hose lines under pressure.

System extinguishes liquidmetal fires by discharging dry powder through nozzles installed over hazard areas.

(Met-L-X fire extinguishing system is product of Ansul Chemical Co., Dept. CP, Marinette, Wis. . . . or for more information check 1481 on form opposite last page.)

#### All-plastic safety hat resists extremes in temperatures

Manufacturer has developed low-price all-plastic safety hat that exceeds all standard safety requirements for resistance to pressure, impact, combustion, and voltage. In addition, plastic shell withstands severe extremes in temperature, and is especially useful in zero and subzero climates. Suspension system provides comfort and pro-

(Safety hats are products of General Textile Mills, Inc., Dept. CP, 450 Seventh Ave., New York, N. Y. . . . or for more information check 1482 on form opposite last page.)

## The RAYMOND Multi-Purpose IMP MILL ... the Answer to Your Grinding Problem



by different arrangements of the equipment.

It offers scores of uses in the chemical industries:—For disintegrating, blending and classifying materials to make uniform, intimate mixtures .. for grinding and drying in one operation . . . for making extreme fine powders in combination with a Raymond Mechanical Air Separator, or removal of fines for producing granular materials with supplementary screen separation.

Tell us your requirements in capacity and type of materials, and Raymond engineers will be pleased to make specific recommendations.

Ask for Raymond's new Imp Mill Bulletin No. 77.

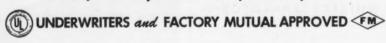
#### COMBUSTION ENGINEERING, INC. 317 North Branch St. Chicago 22, Illinois Sales Offices in Principal Cities Sales Offices in Principal Cities 1317 North Branch St. Chicago 22, Illinois

COMBUSTION ENGINEERING-SUPERHEATER LTD., Montreal, Canada

Check 1483 opposite last page.

## GOODALL "EZ flex" THE Wodern FIRE HOSE

Stronger! Lighter! Longer Lengths!



FOR INDUSTRIAL, COMMERCIAL AND MUNICIPAL FIRE PROTECTION

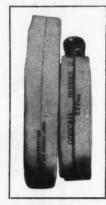
The greatest advance in fire hose construction in over half a century . . . demonstrating an entirely new concept of fire hose weight, strength and flexibility, made possible by the use of new materials and methods of manufacture.

JACKET — A combination of high-tensile fibres of outstanding strength, woven by a special process, assuring highest resistance to pressure, wear, weather and rough handling. Size-for-size, "EZflex" pressure-resistance is equal or superior to the heavier and stiffer conventional cotton jackets, despite its much lighter weight. The tightly woven fabric is virtually snagproof, and is treated to resist mildew.

**LINING** — A light-weight yet long-wearing reinforced rubber lining, bonded firmly to the surrounding jacket, and having a perfectly smooth waterway to insure a full, fast flow. In combination, the "EZflex" jacket and lining provide a fire hose far ahead of conventional types in strength, flexibility, durability, ease of handling, and economy. Single Jacket, Sizes 1½" to 2½". Double Jacket, Sizes 1½" to 3". Maximum lengths of 100 feet.

#### "DRI-RACK" FIRE HOSE

Used in place of Unlined Linen Hose for indoor protection wherever fire hose must be ready for reliable use after long periods of storage. Exceptionally light in weight and extremely flexible . . . folds into smaller space. No "weeping" while jacket is reaching maximum absorption, as with linen hose—all the water goes on the fire! The seamless, laminated, reinforced rubber lining is tough and durable, and will stay "alive" for years. Single Jacket, Sizes 1½" and 2½"; maximum length, 100 feet. Underwriters and Factory Mutual Approved.



COMPARE!

Left: A 50 ft. coil of standard Cotton Rubber Lined, weighing 21 lbs. Right: A 100 ft. coil of "EZflex", weighing only 19 lbs.



**Contact Our Nearest Branch for Details and Prices** 

Standard of Quality—Since 1870

HOSE . BELTING . FOOTWEAR . CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

### GOODALL Rubber Company

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J. BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES. IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

Check 1484 opposite last page.

SAFETY



#### Spray-on detector solution exposes gas, air leaks in pressure systems

Used for detecting leaks in pressure systems, special solution is sprayed on by means of unbreakable, refillable dispenser. Solution spreads over surfaces and creates growing cluster of bubbles wherever leak occurs.

(C-Leak is product of A & H Engineering Company, Dept. CP, 1425 Campbell St., Glendale 7, Calif. . . . or for more information check 1485 on form opposite last page.)

#### Safe acid dispensing

Equipment for automatic and/ or continuous dispensing of acids without subjecting operator to contact with acid or exposure to fumes is described in two-page bulletin. Bul B-I-F P-3 — Proportioneers, Inc., Div. of B-I-F Industries, Inc., Dept. CP, 345 Harris Ave., Providence 1, R.I. Check 1486.

#### Improved leak detector features low cost, quick recovery

Costs less than one-third of comparable units

Uses: For locating leaks in high vacuum, pressure, and other process equipment; as quality control instrument in leak testing wide variety of manufactured items.

Features: According to manufacturer, unit costs onethird as much as detectors of comparable sensitivity. Design innovations overcome disad-





## ELECTROMAGNETIC SEPARATORS belong in your PLANT



#### FRANTZ DRY FERROFILTERS

are used in hundreds of plants for removing iron particles — whether extremely fine in size or large bits and pieces — from powdered and granular materials.

Other FERROFILTERS are made for taking iron particles out of liquids and slurries.

Send for BULLETIN 56-E for full information on all models; sizes and capacities available.

#### S. G. FRANTZ CO., INC.

Brunswick Pike & Kline Ave.

P. O. Box 1138 Trenton 6, N. J.

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## HOW TO CUT **VALVE COSTS**

on corrosive services

You'll save maintenance, replacement and down time dollars when you specify Rockwell-Nordstrom lubricated plug valves. The combination of corrosion resisting metal plus lubricant protection means that they will do a better flow control job, longer, and at lower cost than any other valve you've ever used.

The pressurized lubricant in Rockwell-Nordstrom valves assures a continuous, leakproof seal that stays tight on even the most corrosive services . . . costly reseating problems are eliminated. Lubricant also forms a tough protective film on the working surfaces and stops metal-tometal wearing friction.

Rockwell-Nordstrom valves are available in a full range of sizes and pressure ratings in semisteel, steel, stainless steel, bronze, Monel and other corrosion resisting metals. They cost no more, often less, to buy than ordinary valves. Write for complete details. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

#### ROCKWELL-Nordstrom VALVES

Lubricant Sealed For Positive Shut-Off

Check 1488 opposite last page.



Simplicity of operation, compactness, and portability are features of leak detector

vantages of earlier halogensensitive leak detectors.

Description: Halogen-sensitive leak detector is operated by connecting to system or part under test which is then evacuated with mechanical vacuum pump. When pressure of 80 to 200 microns is attained, outside of part is blanketed with tracer gas. Easily available, low-cost Freon-12 is used. If leak is indicated, further probing with fine stream of gas locates source with pinpoint accuracy. (Model 4902 vacuum leak detector is product of NRC Equipment Corp., subsidiary of National Research Corp., Dept. CP, 160 Charlemont St., Newton Highlands 61, Mass.)

Check 1489 opposite last page.

Look sharp, be safe with modern styled safety glasses

In addition to safety, comfort, and convenience features, manufacturer's safety glasses offer ultra-modern lens and plastic frame styling to enhance their appearance. Rigid frames are designed to retain their shape without bowing. Broad-bearing nose pads provide more comfortable distribution of weight.

(Safety glasses are available from Chicago Eye Shield Company, Dept. CP, 2300 Warren Blvd., Chicago 12, Ill.) Check 1490 opposite last page.



Acheson Dispersed Pigments Co., Philadelphia, produces black polyethylene concentrate in granular form from which insulation compounds for electric cable and wire are made. To protect the purity of their products they use the RCA Metal Detector, thus preventing rejected shipments due to metallic contamination. Presence of metal in the insulation would render the cable useless. Metal particles in their products are also a clue to defective machinery. By analyzing the rejected materials they can go back to the machine and repair it before serious damage results.

Both magnetic and non-magnetic metals are detected as this electronic marvel "looks" below the surface and spots automatically any that could prove harmful to machinery, products, or reputation.

> Why let stray metal cut into your profits? Get the whole story-mail coupon.



Check 1491 opposite last page.



Famous for many firsts in the industry, Laboratory Furniture's newest improvement for fume hoods, the SAFE 'n EASY way, provides the perfect answer to an old problem. Now, with one simple motion, you can move the baffle by remote control and change the Air Flow inside the operating fume hood . . . without removing the apparatus, and with the sash open or closed. An exclusive STEELAB and WOODLAB feature!



"STEELAB," Revised Edition.

Hundreds of ideas for

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Most complete fume control prospectus in the industry.

WRITE OR CALL TODAY FOR THESE VALUABLE PLANNING AIDS They're FREE!



LABORATORY FURNITURE COMPANY....

Over \$5 Years of Specialized Service to Laboratories MINEOLA, LONG ISLAND, NEW YORK . PHONE: PIONEER 2-3600

Check 1492 opposite last page.



Developed as rapid moisture and density tester for soil analysis, radiation test unit is a 'natural' for quality control of large batches of incoming raw materials. Its big advantage is that it . . .

## Tests Density or Moisture in Two Minutes

Uses: Developed as an aid to speed sub-grade soil studies, moisture and density tester can be applied - easily - to quality control problems involving the sampling of large quantities of material. Instrument can be used for density determinations on any material. It is also suitable for moisture measurements on materials which do not contain "bound" hydrogen to any large extent or any one of several elements - boron, chlorine, lithium, cadmium. Typical applications would involve checking moisture content and density of large quantities of elemental sulfur, cement, soda ash, sulfates, phosphates, or any other inorganic material of the same

Features: Big advantage of moisture and density tester is that it tests large samples in two minutes or less. Need for compositing is sharply reduced. In most cases, it should not even be necessary to consider compositing.

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\*Description: The time-saving method for measuring density or moisture requires two units - a probe and a counting scaler. Complete determination of either quantity can be made within two minutes by operator. Operation requires only that probe be placed in close contact with material being tested, and a reading be taken on the scaler. Count varies with moisture or density variations. Percent moisture or density is determined by use of chart supplied by manufacturer.

#### How It Works

Operating principle is based on use of nuclear radiation. Source of energy is applied to sample and then the amount of radiation "scatter" is measured. Since moisture or den-

sity variations cause corresponding variations of "scatter," measurement of this amount is also a measure of moisture content or density.

Either of two probes are used, depending upon measurement desired. Neutron probe for moisture determinations contains radium beryllium source of fast neutrons and a boron trifluoride slow neutron detector. Density probe contains three Geiger tubes and cesium-137 source of gamma rays.

Originally developed by manufacturer in conjunction with Corps of Engineers for rapid testing of soil for aircraft runways, instrument has already been in use for over two years. Technique of non-destructive testing has allowed reproducible determinations with a good degree of accuracy. Usually, tests have been made for both density and moisture to accuracies of



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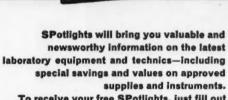
Moisture or density probe (at left) contains source of radiation energy. Portable scaler, with five glow tubes, indicates count. Timer at bottom of scaler may be set to any time between 0-5 minutes. Usually a 1 to 2 minute count is sufficient

within one percent of results achieved with laboratory

Portable scaler is designed for continuous outdoor operation, if necessary. Rechargeable batteries, self-contained within the scaler, provide 30 to 35 hours of use before recharging is necessary. Scaler can also be operated on 110v AC power source or from a 6v automotive battery. Scaler is waterproof, dustproof, shockresistant, and unaffected by temperature or humidity over an ambient range from -10Turn to next page

FOR THE LATEST NEWS ON INSTRUMENTATION

Write for your regular SPOTLIGHT SPOTLIGHT 17,000 r.p.m. high speed Angle CENTRIFUGE with full instrumentation An outstanding addition to the most complete line of Centrifuges in the industry! Instrumentation is complete—including autotransformer speed control, combination ammeter and electric tachometer, automatic timer, timer cutout switch, low voltage release and pilot light, • Speeds up to 17,000 r.p.m., forces up to 34,390 XG. Exclusive remote control—instrument panel easily removed for connection to centrifuge by extension cord. Completely sealed 8 x 50 ml head. Adapters available for 10 and 15 ml tubes. Self-balancing controlled drive • Unit is 21 in. high, 14 in. wide, 17 in. deep. ½ H.P. motor. For 115 volts AC, 50-60 cycle single phase. No. 59855—International Model HT Centrifuge. 8-place head for 50 ml tubes (but without tubes)......\$745.00 WRITE Scientific Products Division of American Hospital Supply Corporation SPotlights will bring you valuable and Department CP . 2020 Ridge Avenue . Evanston, III. newsworthy information on the latest Please place my name on your mailing list for SP Bulletins.



To receive your free SPotlights, just fill out and mail the coupon at right-or check No. 1493 on the Readers Service Card in this magazine.

Check 1493 opposite last page.

Company

Address\_



... powerful roof ventilator with NEW Smoke-Trip Damper Opener

> Because Propellair Sky Blast roof ventilators do not need the usual restricting weather cover which deflects and reduces air movement, they move more air at less cost. Fumes and heat are thrown high into the air, can't re-enter windows or turn downward to create roof maintenance problems. Their efficiency is not effected by wind velocity or direction. Weatherproof dampers open automatically when fan is started. Hot-dip galvanized after fabrication, Propellair Sky Blast ventilators are ruggedly built to give years of maintenance-free service. Available in sizes from 16" to 60" for 2820 to 78,800 CFM-PFMA Certified Ratinas.

> If desired, exclusive new Smoke-Trip heat-actuated venting device which automatically opens dampers in case of fire to exhaust smoke and fumes is available.

> > WRITE FOR BULLETIN NO. 680-C



AIR IS OUR BUSINESS MOVING

Check 1494 opposite last page.

#### LABORATORY

#### **Density Tester**

Starts on page 206

to 125°F.

Containing shields to eliminate any possible accidental safety hazard, operational safety in use of the instrument requires only normal care as in any radioisotope application. Normal use of the test unit provides no danger to operating personnel.

(d m-Gage is product of Nuclear-Chicago Corp., 223 W. Erie St., Chicago 10, Illinois.) Check 1495 opposite last page.

#### Polyethylene lab ware

Bulletin of eight pages describes and illustrates unbreakable, chemically inert, lightweight polyethylene laboratory ware. Graduated cylinders, beakers, aspirator bottles, and translucent tubing are among items listed. Bul FS-268 - Fisher Scientific Company, 303 Fisher Bldg., Pittsburgh 19, Pa. Check 1496.

#### Laboratory recorder is versatile

Measures either voltage or current on 40 ranges

Uses: As multi-range vertical strip chart recorder for laboratory bench operation. Can be used to record pH, temperature, any variable that



Recorder can be used with automatic titrating equipment

can be expressed as a voltage or current function of time.

Features: Laboratory recorder is versatile, having nine standard chart speeds and forty different ranges with an accuracy of 0.1% or

### straub Exothermic **Gas Generators**



#### ... for low cost inert gas production

 STRAUB Gas Generators provide a low cost. dependable source of inert gas for blanketing or purging in a variety of chemical and petroleum processing operations.

Compact, simple to operate and practically maintenance free, STRAUB Exothermic generators produce a gas consisting essentially of N2 and CO2.

A complete range of models is available in capacities from 1500 to 20,000 C.F.H.

Send for this descriptive catalog



A. A. STRAUB COMPANY, INC.

Check 1497 opposite last page.

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and SAFETY CANS

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CATALOG NUMBER 569-S10

Check 1498 opposite last page.

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ESSING

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#### LABORATORY

20 microvolts, whichever is greater.

Description: Instrument is automatic, self-balancing potentiometric recorder. Chart drive can be either forward or reverse, with magnetic brake to eliminate coasting when stopped. Recording speeds are 1/3, 1/2, 1, 11/2, 2, 2 2/3, 4, 8, and 12 inches per minute.

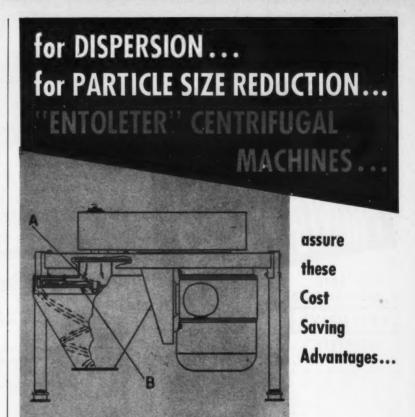
Consisting of three selfcontained units, recorders can be separated into control panel assembly, amplifier and power supply chassis, chart and pen drive chassis unit. High stability power supply using combined or alternative dry cells and mercury cells obviates need for standardization over long periods. Pen is interchangeable ballpoint. Pen speed is 1.8 seconds full-scale. (S-72150 Recorder is product of E. H. Sargent & Company, Dept. CP, 4647 W. Foster Ave., Chicago 30, Ill. . . . check 1500 on form opp. last page.)

#### **Pressure** measurents

Detailed information on manufacturer's precision, portable, electric manometer with digital read-out is contained in 4-page bulletin. Bul 1547A — Consolidated Electro-dynamics Corp., Dept. CP, 300 N. Sierra Madre Villa, Pasadena, Calif. Check 1501.



"Didn't the men tell you that we furnish standard soiled samples for evaluating detergency?"



- LOW HORSEPOWER REQUIREMENTS
- DIVERSITY OF PRODUCT APPLICATION
- LARGE OR SMALL CAPACITIES
- ADAPTED TO BATCH OR CONTINUOUS SYSTEMS
- **DEPENDABLE OPERATION**

Operation of the "Entoleter" Centrifugal Machine:

The product is fed by the inlets and distributor to the center of the rotor (A) consisting of two steel discs (B) spaced approximately one inch apart by specially designed impactors.

The material is spun out, by centrifugal force, into a thinning film as it approaches the periphery of the rotor. Powerful uncushioned impact action causes every particle of the material to be thoroughly processed by the "ENTOLETER" CENTRIFUGAL MACHINE.

> For descriptive bulletins or information on free application tests in our Development Laboratory . . . contact the ENTOLETER DIVISION, P.O. Box 904, New Haven, Connecticut.



ENTOLETER DIVISION SAFETY INDUSTRIES, INC.

New Haven 4 Conn

Check 1502 opposite last page.



EXCLUSIVE

the only gloves made with HYCAR

No other gloves wear so long, provide greatest resistance to acids, chemicals, oils, solvents, abrasion and snagging. Sureseals outwear rubber and other synthetic types up to 14 to 1— and resist snagging and puncture 4 to 8 times greater. Made in various weights and lengths to match your need. Use the coupon today for free test.

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Check 1503 opposite last page.

LABORATORY

Has "handy" weight rack on base of balance

Auxiliary tare poise is spring-loaded

Uses: Preparation of solutions, general laboratory weight measurements requiring capacities to 45 lb or 20 kg.

Features: Heavy-duty balance has "handy" weight rack on base of balance. Unit has



Heavy-duty balance has weight

spring-loaded auxiliary tare poise for faster and easier taring of empty containers.

Description: Balances have been designed to withstand effects of corrosion by use of aluminum, stainless steel, and protective finishes. Bearings are self-aligning. Beam is light-weight aluminum alloy to reduce inherent weight and increase sensitivity. Graduated dial permits reading of balance position. One model has sensitivity of one gram in 20 kg. Models are available in metric and avoirdupois standards.

(Heavy-duty solution balance is product of Ohaus Scale Corporation, Dept. CP, 1050 Commerce Ave., Union, N.J. . . . check 1504 on form opposite last page.)

Boosts effective range in chromatographic analyses

Thermal conductivity cell operates to 325°C

Uses: As high temperature thermal conductivity cell for chromatographic analysis of liquids with boiling points to 425°C, operating over range from 30° to 325°C.

Features: Cell may be incorporated into any existing chromatographic apparatus.

Description: Flake thermis-



Check 1505 opposite last page.



Alnor Pyrometers are designed to give consistently accurate temperature readings under the most severe conditions of vibration, dirt and corrosive atmosphere. Sturdy, laboratory precise movements are cushioned in fume-proof, splash-proof welded steel cases in front of board or flush type mountings. Six series available for single circuit up to 31 circuit applications. Eleven standard ranges covering 0-300° F. to 0-3000° F. or centigrade equivalents.

Single-circuit series data is covered in Bulletin 4371.

Multi-circuit series data covered in Bulletin 4361.

Circle number you wish; attach this ad to your letterhead, and mail to: Illinois Testing Laboratories, Inc., Room 504, 420 N. LaSalle St., Chicago 10, Ill.

> PRECISION INSTRUMENTS FOR EVERY INDUSTRY



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ESSING

Operating range of thermal conductivity cell covers most organic compounds

tors are used as sensing elements. Thermal conductivity cell consists of three separate units: detector — enclosed in a specially-designed oven for minimum drift at maximum sensitivity; temperature controller; and bridge circuit with power supply. Temperature controller has proportional control for accurate temperature monitoring. Bridge circuit is a specially-designed Wheatstone bridge for use with flake thermistors.

(Model 75 conductivity cell is product of Barnes Engineering Company, Dept. CP, Stamford, Conn. Check 1507 on form opposite last page.)

## Tests pore structure of any material

Measures pore sizes and pore volumes

Uses: Predicting useful life of many materials including metals, plastics, textiles, ceramics, and many others. Toughness of a paint job might be a typical problem.

Features: Pore analyzer is portable. Can be used to test pore structure of any material.

Description: Instrument is based on principle that mercury will penetrate pores of any porous material if sufficient pressure is applied. Initially, a small sample piece of material to be tested is placed within a glass enclosure. In this location, only pressures



Check 1508 opposite last page.



## FOR HASTELLOY C AND TEFLON CONSTRUCTION

For applications from 0 to 2 gpm, here is a self-priming pump designed for the most severe corrosive service in laboratory and pilot plant installations. Because of rugged construction, "Minilab" pumps can be used around-the-clock.

Internal, self-lubricating Teflon bearings eliminate all problems of product contamination. In addition, the pump can be steam and chemically sterilized. Yielding a linear flow, ideal for constant-flow metering, the unit is reversible and may be staged for higher pressures.

Send for complete specifications and pump curves.

Hastelloy — trademark of Union Carbide Corp.

Teflon — trademark of E. I. duPont

see ECO'S complete line at the CHEMICAL SHOW

ECO

He big name in small pumps.

ENGINEERING COMPANY.

12 NEW YORK AVE., NEWARK 1, N.J.

MArket 4-6565

Check 1509 opposite last page.

#### LABORATORY

below atmospheric are used to force mercury into pores. Smaller sized pores are measured by placing sample in a stainless steel pressure vessel. Here, pressures to 3000 psi are applied to sample. As pressure is raised mercury is forced into smaller and smaller pores.



Pore analyzer tests pore structure of any material

Volumes of pores are indicated by mercury level in calibrated container.

Instrument measures sizes of pores from 0.1 millimeter to 0.06 microns, and determines pore volumes small as 0.0005 ml at each pore diameter.

(Porosimeter is product of American Instrument Company, Inc., Dept. CP, 8030 Georgia Ave., Silver Spring, Md. . . . or for more information check 1510 on form opposite last page.)

### Permits remote control of fume hoods

Rate of air flow can be changed during operation

Uses: Controlling air flow for fume exhaust during operation of fume hood, with safety sash open or closed.

Features: Device is operated by handle, located on outside control panel, eliminating necessity of removing apparatus to adjust baffles.

Description: Device allows chemist to adjust baffle top and bottom inside fume hood for any desired air flow apertures. Remote control device is available as optional feature



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CHEMICAL PROCESSING



Chemist can control air flow through fume exhaust - with safety sash closed

manufacturer's line of fume hoods.

("Safe 'n Easy" remote control is product of Laboratory Furniture Co., Inc., Dept. CP. Old Country Road, Mineola, L. I., N.Y. . . . check 1512 on form opposite last page.)

#### Vapor phase analyzer is desk-size

For laboratory or field use

Uses: Analyzing gaseous or liquid mixtures for components boiling up to 125°C. Can be used for hydrocarbons from methane to nonane.

Features: Analyzer is vapor phase chromatographic unit, designed as a desk model for use in laboratory or field.



Chromatographic analyzer handles hydrocarbons to nonane

Description: Instrument has an interchangeable sampling system for either liquids or gases. Detector is highly sensitive thermistor thermal conductivity cell. Instrument will accommodate columns up to approximately 30 ft in length.

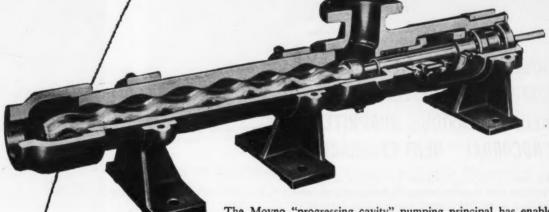
(Chromagraphette Series 9490 is product of Podbielniak, Inc., 341 East Ohio St., Chicago 11, Illinois.)

Check 1513 opposite last page.

from abrasive slurries to delicate foods . . .

# MOYNO PUMPS

**CUT HANDLING COSTS** 



The Moyno "progressing cavity" pumping principal has enabled thousands of plants to pipe difficult materials that were transported by hand and other expensive means. Moyno is the only pump that can handle many abrasives, pastes, slurries, chemicals, foods, suspended solids, etc. without foaming, aerating, crushing or excessive pump wear.





As shown above, Moyno Pumps have a screw-like rotor that revolves in a double threaded stator creating progressing cavities which smoothly move material through the pump. They will pump anything that will move through a pipe . . . even plaster and nonpourable pastes!

Moyno Pumps are available in capacities up to 500 gpm and pressures up to 1000 psi.

Examine your processing methods. No doubt there are several places where Moyno Pumps can drastically cut costs. Ask us, we'll give you a frank answer. Send us an outline of your problem today! Write for Bulletin 30-CP











Check 1514 opposite last page.

RIES

t page.

ESSING



Over 200 Nocordal grid immersion heaters installed by one leading chemical company.

## SOLVE YOUR TOUGH CORROSION PROBLEMS WITH HEIL IMPERVIOUS GRAPHITE "NOCORDAL"" HEAT EXCHANGERS!

To meet your requirements for highly corrosion resistant heat transfer units, Heil engineering specialists have developed Impervious Graphite "Nocordal."

Ideal for a wide variety of chemical process applications, including electroplating, pickling, Heil "Nocordal" units offer exceptional heat transfer properties; exceeds most metals in heat conductivity . . . high thermal shock resistance . . . and protection from acids, solvents, salt solutions, steam and gases. Standard designs will fit practically any application . . meaning lower initial cost . . . greater long-run economy!



Shell and Tube Exchangers with Nocordal Tubes. Also available with nickel, steel and other alloy tubes.



Nocordal "U" Coils. These immersion units are also available in "L" shape and bayonet style.

HEIL also produces: Tanks, Linings, Exhaust Systems, Tank Covers, Lined and Solid Plastic Fans, Fume Scrubbers, Packed Towers.

One source - One responsibility



### HEIL PROCESS EQUIPMENT

CORPORATION

12901 Elmwood Avenue \* Cleveland 11, O.

\*Trade name.

Check 1515 opposite last page.



PROCESSING EQUIPMENT



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Vibrating-screen separator handles abrasive zirconium oxide particles, needs no maintenance

Zirconium oxide powder is so abrasive it is used to polish glass.

Blinding and excessive wear occurred during dry screening
until Zirconium Corp. found that vibrating secreen separator gave . . .

# long screen life handling abrasives



Separator's vibration is caused by rotating weights. Variable control of screening pattern can be obtained by adjusting angle of lead of lower weight over top weight on motor shaft

THEODORE W. WETT, Assistant Editor
With E. C. SARGENT, President
Zirconium Corporation of America, Solon, Ohio

Problem: Screens blinded and wear was excessive at Zirconium Corp. of America, when zirconium oxide powder was handled on conventional shaker screening equipment. Dry screening was necessary to assure required ultra-high purity and uniformity of finished product.

Zirconium oxide powder (zirconia) is a heavy, white, inert material with a highly abrasive nature. It is similar in structure to cerium oxide and can be used for glass polishing. Zirconia is screened through 100 mesh at rate of 50 to 150 lb/hr at a

temperature of about 120°F.

Zircon sand and dolomite are intimately mixed and charged to a kiln where temperatures reach 2500°F. Kiln product is ground and leached with sulfuric acid to remove silicates. Solution is then neutralized, thickened, filtered, dried, and screened. Resulting zironia melts above 4700°F and is finding increasing use as a refractory, electrical resistor, abrasive, and catalyst support.

Three different screen separators were tried without

Solution: In 1955 Zircoa installed an 18" vibrating-screen separator to handle dry zirconia. Separator is primarily a rigid body virbrating about its center of mass. Vibration is accomplished by a combination of two eccentric weights on upper and lower ends of motor shaft. Upper weight causes vibration in horizontal plane of motion. Lower weight causes vibration in vertical and tangential planes of motion. By changing relative positions of weights variable control of screening pattern can be obtained. This gyrating screen assembly floats freely on supporting springs so that no vibration is transmitted to the supporting base or adjacent machinery. Screen cloth is stainless steel.

Results: Despite abrasive characteristics of zirconia, operation of separator has been maintenance-free. Screening is accomplished without blinding experienced with former equipment and ultra-high purity and uniformity are assured. Screen life has been increased to a minimum of 18 months in continuous opera-

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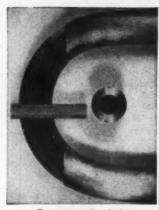
Zircoa has found this unit to be highly versatile. Present plans are to install additional separators for wet screening of 100 mesh crystals from -325 mesh; wet screening to 325 mesh; and dry screening to 200 mesh.

(Sweco vibrating screen separator is a product of Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 58, California.)

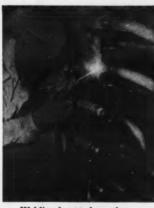
Check 1516 opposite last page.

#### BRIDGEPORT BRASS

## COPPER ALLOY BULLETIN



Cutaway and end view of heavy wall duplex.



Welding bent tube ends on to straight tube lengths.



Assembled tube coils showing tube ends in place.

#### 5,016 Feet of Heavy Wall Bridgeport Duplex Tube Provide **Economical Answer to Unusual Pressure and Corrosion Problem**

**Unique Fabrication Methods** Used to Bend 22-ft. Lengths to Small Radius

In building a new anhydrous ammonia plant for Northern Chemical Industries of Maine, the designer of the installation faced a number of important considerations in selecting the coils for the plant's primary and secondary condensers.

First, the condenser tubes had to be heavy enough to pass a hydrostatic test of 7500 psi. Second, unique fabricating requirements had to be met; tube ends had to be shaped into J-bends well under the usual minimum bend radius. Third, the "standard" problems of ammonia and sea-water corrosion had to be solved. Throughout, cost was a constant consideration.

#### Condenser Make-Up

The condensers themselves consist of one section with fourteen parallel banks of six passes each, and a section of fourteen parallel banks of ten passes each. Each section has an inlet and outlet header

**Bridgeport Duplex Chosen** 

Bridgeport Duplex Tube was selected, heavy steel inside to withstand pressure and resist ammonia corrosion, and .065" inhibited Admiralty cladding on the outside to combat sea-water corrosion. Stainless steel was considered, but because of its debatable service life and cost, was not chosen. The cost of Cupro-Nickel and Nickel-Copper Alloy was also too high. Admiralty-clad Duplex Tubes, on the other hand, have an estimated life of eight years-plus.

#### Precise Fabrication Problems

The near-mile of tube that went into both condenser coils was supplied in 22-foot lengths and was formed into finished coils by Portland Copper and Tank Works, Inc., So. Portland, Maine. One end of each tube had to be bent to a 4-7/16" radius, a job so precise that a special bending die was designed and built for the job.

Joining the bent tube lengths into finished coils involved stripping back the Admiralty cladding two inches from the end of each tube length. The exposed steel tube ends then were welded together and the weld surface ground smooth with the OD of the tube. Sixinch Admiralty sleeves were slipped into place and brazed in position. Special fabricating techniques were observed throughout every step of the operation.

#### **Bridgeport for Precise** Requirements

Bridgeport Duplex Tubes, of many varieties, have a long history of service and efficiency. As in this case, they are often the economical answer to a number of problems. Their wide use in ammonia refrigeration systems, ammonia and synthetic rubber production, the process industries, chemical plants, the petroleum industry and coke byproducts plants is an "in-service" endorsement which can be applied to your own needs.

Bridgeport's experience with virtually every kind of corrosion and fabricating problem can serve you well. Put it to work for you. Call your nearest Bridgeport Office today.



#### BRIDGEPORT BRASS

Bridgeport Brass Company, Bridgeport 2, Connecticut • Offices in Principal Cities In Canada: Noranda Copper and Brass Limited, Montreal

Check 1517 opposite last page.



Handling water base paint and operating 16 to 24 hours per day . . . every day, these Oliver Diaphragm Slurry Pumps installed at the Newark, Ohio plant of the Owens-Corning Fiberglas Corp. are employed to maintain pressure in the paint feed line to spray gun manifolds for the spraying of acoustical tile block.

The Owens-Corning installation is but another example of the ability of Dorr-Oliver Pumps to provide the solution to "problem pumping" applications. With the diaphragm operating pneumatically there is no stuffing box, thus no leakage. The reliability and low maintenance features inherent in this link-free design can readily be interpreted in terms of reduced operating costs. In addition, the O.D.S. is capable of handling materials ranging from clear liquid to slurries containing up to 60% abrasive solids.

For a free copy of Bulletin No. 5003 covering the Oliver Diaphragm Slurry Pump, just drop a line outlining your particular problem to Dorr-Oliver Incorporated, Stamford, Connecticut.



Check 1518 opposite last page.

#### PROCESSING

#### Self-contained control unit designed for metering fertilizer solutions

Uses: Metering phosphoric acid, aqua ammonia, or other suitable nitrogen solutions, and water in pre-selected amounts for simultaneous delivery to auxiliary batch-mixing unit.

Features: Self-contained unit can be quickly installed in field by connecting raw material supply lines, discharge lines, and electrical connection.



Automatic control unit can be quickly installed in field

**Description:** Unit was developed primarily for use with manufacturer's batch-type fertilizer solution processing plants.

When installed, it converts manually-operated plants to automatic operation.

("B&L Autobatch" is product of Chemical Plants Div., Barnard & Leas Mfg. Co., Inc., Cedar Rapids, Iowa.)

Check 1519 opposite last page.

#### Packaged CO<sub>2</sub> plants produce gas at cost of 1 cent per lb

Uses: Producing carbon dioxide for small water plants.

Features: Package system operates on either methane or propane gas and will produce CO<sub>2</sub> for about one cent per pound.

Description: Units are spe-



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DEMINERALIZED WATER AT CAPACITY OF 2000 G.P.H. is produced by the Barnstead Model TM-6, Two-bed Domineralizer. A complete package-type unisuch as this includes heavy steel column lined with thick sheet rubber, handy multiport valves, acid and alkali resistant throughout.



EASY TO REGENERATE 4-BED CABINET TYPE Barnstead model FR-2 produces extremely pure demineralized water at flow rates of from 30 to 100 gallons per hour. Stainless steel cabinet. Standard equipment includes filter, purity meter, flow rate indicator, pressure gage, valves, regenerant tanks.

1,000,000 OHMS RE-SISTANCE demineralized water is produced by this mixed bed demineralizer. Transparent lucite column. Stainless Steel cabinet with polyvinyl chloride piping and valves. Other mixed bed models produce up to 2,500 gallons per hour.



NEW YORK
Kingsbridge
8-1557
6-6822
PHILADELPHIA
LOCUS
8-1796
1-9373
SAN FRANCISCO
TEmplebar
6-5863

- ☐ Catalog "G"—Barnstead Water Stills
- ☐ Catalog 127—Barnstead Demineralizers
- ☐ Bulletin 141-MF Submicron Filter



66 Lanesville Terrace, Boston 31, Mass.

Check 1520 opposite last page.

CHEMICAL PROCESSING

cifically designed for water plants of 2 MGD and less. Capacities range from 55 to 660 pounds CO<sub>2</sub> per day. They are intended for lime softening plants as small as 100 gpm, and may be used in plants up to 1400 gpm.

In operation, natural gas, liquid petroleum gas, or manufactured gas is burned at atmospheric pressure by a

Two-bed Deckage-type unit steel columns, handy multi-lkali resistant

BED CABINET

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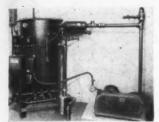
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Stillis

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31, Mass.

ESSING



Units are completely shop-assembled, ready for installation

raised port-ring type burner in an open combustion chamber.

Products of combustion are drawn through 12'' of water to cool them. They are then run through a water separator. Cleaned  $CO_2$  is passed to blower for compression to 4 to 6 psi.

Units are completely shopassembled ready for installation.

(Series "O" and "OO" Carball carbonation units are product of Walker Process Equipment Inc., Dept. CP, 840 N. Russell, Aurora, Illinois . . . or for more information check 1522 on form opposite last page.)

#### Ultrasonic transducers are corrosion resistant and leakproof

Stainless steel housings have arc-welded joints

Uses: For ultrasonic cleaning of meters, instruments, and other equipment.

Features: Stainless steel housings have arc-welded joints making transducers leakproof and corrosion resistant.

Description: Two types of



## Metallurgists...

## ERASE HYDROGEN, OXYGEN AND NITROGEN FROM YOUR MELT!



KINNEY High Vacuum Equipment includes Evaporators in laboratory and high production sizes . . . High Vacuum Furnaces for laboratory determinations, pilot plant and large scale production models . . . High Vacuum Curing Ovens . . . Vacuum Degassing Equipment for Ferrous and Non-Ferrous Castings. The F-9 Furnace shown handles up to 5 lbs. of metal . . . induction or resistance heating with temperatures to 2000°C and over.

#### WRITE:



Get full information on new developments in KINNEY High Vacuum Pumps and complete engineered High Vacuum Equipment. The elimination of contaminating gases provides much more than improved grain structure for ferrous and non-ferrous metals. Metallurgists find that High Vacuum imparts distinctly new attributes . . . in many cases the end product might well be considered an entirely new one.

Work with Titanium, Selenium, Germanium, Silicon, Magnesium-Fluoride and other substances emphasizes the great need for "clean" High Vacuum atmospheres to reach ever-higher targets in purity. And the tools to attain the clean High Vacuum . . . to erase Hydrogen, Oxygen and Nitrogen and other contaminants are:

## Kinney ®

KINNEY Pumps comprise the most extensive selection of types and sizes in the entire High Vacuum field. There are single-stage Simplex and Duplex Pumps developing ultimate pressures of 10 microns (McLeod) . . . two-stage Compound Pumps with ultimate pressures of 0.2 micron (McLeod) . . . and finally, the famous KINNEY Mechanical Booster Pumps which develop ultimate pressures of 0.2 micron (McLeod) or better! Among these is the ideal Pump for your need!

## THE NEW YORK AIR BRAKE COMPANY

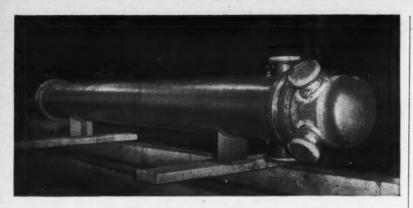
3573K WASHINGTON STREET . BOSTON 30 . MASS.

Kindly send me literatur	re	on
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T KINNEY HIGH VACUUM PUMPS T KINNEY HIGH VACUUM EQUIPMENT

Address Zone State

Check 1523 opposite last page.



## Aluminum translated by Downingtown ...metallurgically speaking

The special problems of aluminum welding and fabrication are another metallurgical "language" that has been expertly mastered at Downingtown. In this fixed-tube sheet heat exchanger unit, aluminum heads, tubes and tube sheets have been combined with a carbon steel shell to meet specific service conditions.

When heat transfer specifications call for aluminum...or aluminum bronze, nickel, copper, stainless steel, or almost any clad or alloy...you'll find the metallurgical idiosyncrasies are well understood at Downingtown. Send for our informative booklet on heat exchanger design.

#### SPECIFICATIONS OF THE UNIT

Materials: Aluminum Tube Side and Carbon Steel Shell Tubes: 192 Alclad Tubes, ¾" O.D. x 16 ga. x 14'0" L

Shell Diameter: 18" Over-All Length: 16' 1"

Design Pressure: Shell Side, 100 psi—Tube Side, 200 psi Test Pressure: Shell Side, 150 psi—Tube Side, 300 psi Design Temperature: Shell Side, 250° F.—Tube Side, 350° F.

Code Stamped: Inspected by Purchaser and Hartford



Putting the finishing touch on another heat exchanger unit built by Downingtown. We build to your specs, or do complete design.



We rolled type 329 stainless steel tubes into types 316 and 304 stainless tube sheets to make this stainless steel replacement bundle.

#### Downingtown Iron Works, Inc.

144 Wallace Ave., Downingtown, Pennsylvania

division of PRESSED STEEL TANK COMPANY Milwaukee

HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

Check 1524 opposite last page.

#### **PROCESSING**

transducers are available in wide range of sizes. One series is fitted with Teflon-gasketed bulkhead mounting so that electrical connection coming from ultrasonic generator is made outside cleaning tank.

Other series can be completely immersed in cleaning fluid. One end of this type is fitted with standard pipe thread into which stainless steel adapter is screwed. This permits insertion of Teflonlined flexible stainless steel sleeve, carrying "hot" lead



Two types of ultrasonic transducers are available

from transducer to junction box on outside of tank.

All transducer edges are square so that several units may be mounted next to each other with no more than 1/32" clearance. Effective cleaning area for single unit ranges from 3 x 53%" up to 6 x 14". By connecting several in parallel, up to 5 sq ft of transducer area can be driven from one ultrasonic generator.

(Ultrasonic transducers are product of Branson Ultrasonic Corp., Dept. CP, 40 Brown House Rd., Stamford, Conn... or for more information check 1525 on Reader Service slip which is located on form opposite last page.

#### Heater is reliable source of long wave length infrared rays

Uses: Providing uniform heat for wide variety of applications, such as drying, preheating, curing, and baking.

Features: Self-contained unit is source of radiant energy supplying heat up to 660°F. Radiation furnished is

#### CLEAN \* SEPARATION

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YORKMESH DEMISTERS
(MIST ELIMINATORS, ENTRAINMENT SEPARATORS)

Are your "Old Fashioned" entrainment separators doing an inadequate job?



YORKMESH DEMISTERS are the Modern Way to do the Complete job of Mist Removal!



Why not take advantage of our vast experience in improving the performance of process equipment. In the past ten years the outstanding success of thousands of installations is proof of the superiority of Yorkmesh Demisters for entrainment control.

Yorkmesh Demisters are used to improve product quality, to avoid losses, and to increase thruput capacity. Our engineers will give careful consideration to the information you submit and will recommend the best answer to your problem. Write for our new bulletin #21.

#### YORKMESH DEMISTERS

improve the performance of:

Vacuum Towers 

Distillation
Equipment 

Gas Absorbers 

Scrubbers 

Evaporators 

Knockout Drums 

Steam Drums



6 CENTRAL AVE. . WEST ORANGE, N.J.

Check 1526 opposite last page.

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, INC.

t page. CESSING in order of 5- to 20-micron wave length. Heating element is tempered Pyrex-brand glass having rugged mechanical properties and outstanding corrosion resistance.

Description: Heater element is mounted in an aluminized steel frame. Unit includes built-in aluminized-steel reflector, mounting hangers, junction box, and leads.

One surface of glass element has a bonded, electrical conducting film (resistance element). When electric current is applied through film, entire glass plate becomes heated.

Because the glass is an effective radiation emitter, and the conducting film is a poor one, radiation leaving glass surface is about twice that leaving film surface. Radiation leaving film surface is directed back to film by metal reflector. Thus, approximately 85% of available radiation is directed toward the work.

Heaters are modular units. Any number of the same size or varying sizes, can be combined to build up the desired heating area.

Units are available with heating areas ranging from 11% x 11%" (750 watts) to 23% x 23%" (3750 watts). Heaters are not explosion-proof. However, in many instances, heater can be used in volatile atmospheres by providing adequate ventilation.

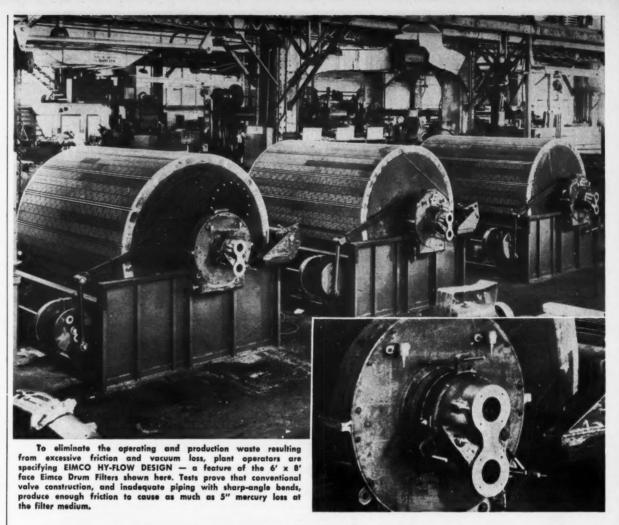
Heaters are usually wired in parallel, on single-phase 115 or 230-v circuits or on balanced 3-phase 230-v circuits. The only maintenance required is to keep heater surface reasonably free of dirt. In most cases, occasional wiping with dry cloth is sufficient.

(Pyrex-brand industrial radiant heaters are product of Corning Glass Works, Dept. CP, Corning, N.Y.

Check 1527 opposite last page.

#### Spray dryer info

Advantages and operation of spray dryers for ceramic industry are discussed in four-page bulletin. Bul 41—Bowen Engineering, Inc., North Branch, N.J. Check 1528.



#### EIMCO HY-FLOW DESIGN HANDLES MORE AT LESS COST

EIMCO HY-FLOW DESIGN enables Eimco Continuous Filters to handle all types of slurries at a high filtration rate and still meet rigid product specifications.

Eimco traced a major source of operating-production "ills" to vacuum loss from friction generated as filtrate and air passed thru inadequate piping and improper flow systems.

This touched off an extensive research and development program resulting in **Eimco Hy-Flow Design**. Sharp, friction-producing bends are diminished to provide a smooth, straight-thru flow of liquid and gas to enlarged ports...minimizing turbulence and vacuum loss. Increased capacity, dryer filter cakes, lower maintenance and downtime costs, improved drainage, no blow back and longer filter media life are some of the important advantages achieved by **Eimco Hy-Flow Design**.

Considerably more than installing larger pipes and re-arranging valve construction was necessary. It called for careful selection of pipe sizes to achieve proper balance between flow rate and efficient filtering, drying and discharge. It involved precision design changes and careful integration of many external and internal features of Eimco filter construction such as: Drum connections, ferrules, pipe spacing, drainage sections, grid patterns and many others.

Using Eimco Hy-Flow Design, many process firms spend fewer investment dollars for smaller Eimco Filters to meet requirements. Experience and know-how in research, designing and manufacturing are your guarantee that Eimco specialized equipment will meet plant requirements, economically. Let us tell you more about the valve and high capacity characteristics of Eimco Hy-Flow Design.

## THE EIM CO CORPORATION

Research and Development Division, Palatine, Illinois

Export Offices: Elmos Building, 31-52 South Street, New York S, N. Y.



Check 1529 opposite last page.



Check 1530 opposite last page.

#### **PROCESSING**

#### **Conveyor furnaces**

Manufacturer's line of electric conveyor furnaces is illustrated and described in four page bulletin. Features and specifications are listed. Bul 357 — Hevi-Duty Electric Co., Dept. CP, Milwaukee 1 Wis. Check 1531.

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#### Metallic dispersions produced in 30 min

Uses: Manufacturing metallic dispersions.

Features: Unit is capable of producing dispersions in large volumes in 30 minutes, with particle sizes as small as ? microns.

Description: Unit operates



Unit makes large volume metallic dispersion production commercially feasible

#### **PROCESSING**

line of electrices is illustrated in four.
Features and re listed. But Duty Electric Milwaukee |

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on principle of impeller dispersion. As applied to sodium, for example, it uses a closed, heated system under dry nitrogen atmosphere. System is charged with metallic brick, dispersing medium, and dispersing aid, and is heated to melting point of metal. Mixture is then dispersed by im-

Action of impeller vanes is translated to hydraulic action in the suspension. As suspension is forced rapidly through itself, resultant hydraulic impact and shear break down particles to ultimate size, and disperse them thoroughly.

(Dispersion mill is product of Morehouse-Cowles, Inc., Dept. CP, 1150 San Fernando Rd., Los Angeles 65, Calif.)

Check 1532 opposite last page.

#### Crushers, pulverizers

Equipment for crushing, pulverizing, and shredding is described and illustrated in four-page bulletin. Bul 257—American Pulverizer Company, Dept. CP, 1249 Macklind Ave., Saint Louis 10, Mo. Check 1533 opposite last page.

## Design of heat exchanger gives high heat removal

Uses: For cooling liquids or condensing vapors in chemical and allied industries.

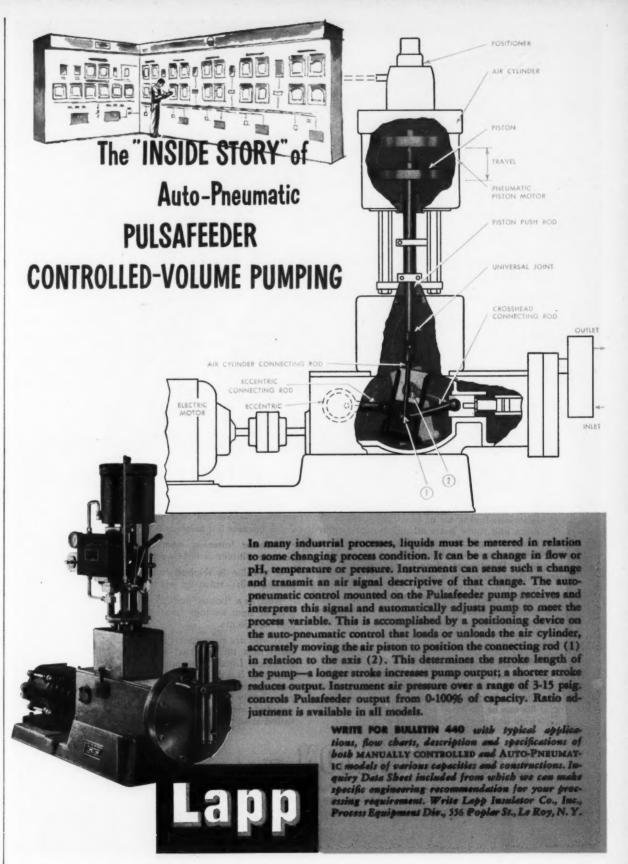
Features: Finned-tube, dual-fan design provides high



Unit consists of finned tubes mounted in casing through which air is drawn by twin fans

heat removal capacity. When used for condensing applications, there is provision for free drainage of condensate.

Description: Heat exchanger consists of finned tubes mounted in casing through



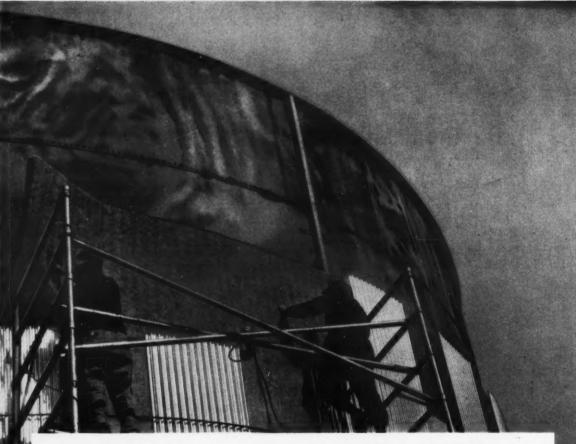
Check 1534 opposite last page.

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CESSING

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### A "deluxe job"-at low cost-with ULTRALITE insulation

Before Ultralite, insulating a tank meant laborious laying up of block after block or batts and more batts all wired together or banded in place with a resulting high insulation cost and many more joints to leak heat. Weatherproofing the completed job with metal made it prohibitively high. But now, Ultralite lowers the cost of insulating so substantially that insulation plus metal weatherproofing is a low cost operation; you can have a "deluxe job"—maintenance free, at reasonable cost.

Ultralite saves material handling costs and speeds up application in many ways.

1. Large sections of tank can be insulated at one time with wide continuous blankets of Ultralite, the long glass fiber insulation. In fact Ultralite can be furnished in blanket rolls up to 10 ft. wide and single thicknesses of 6".

- Ultralite cannot be damaged due to rough handling — will not lose thickness, break or shrink because it is tough and resilient.
- Fewer fastening members are required because Ultralite is light weight.
- Ultralite is shipped to the job in compressed rolls — takes up less space.

And, as a "bonus" feature Ultralite offers greater heat savings because of its low K and less joints.

If you are now specifying blocks or batt insulation for heated equipment with troweled finishes or sprayed-on weather-proofing, it will pay you to investigate the advantages of an Ultralite-insulated job—completely and permanently weather-proofed with metal. Write to G-B for detailed specifications.

Gustin-Bacon

Manufacturing Company



Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

Check 1535 opposite last page.

#### PROCESSING

which air is drawn by two propeller-type fans. Heat transfer is from fluid the tube walls and extended surfaces to air that is exhausted into atmosphere.

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Units are built in for standard sizes with maximum dimensions of 63" in heigh and 126" in length. Arrangements provide for stacking vertically or horizontally in multiple unit installations. Standard construction is hot galvanized steel surface and casings, but other metals may also be used.

("Aero" heat exchanger in product of Niagara Blower Company, Dept. CP, 405 Lerington Ave., New York II, N.Y. Check 1536 opp. last g

#### Valveless filter data

Manufacturer's valveless filter for gravity-flow water filtering applications is described and illustrated in eight-pagbulletin. Operation is caplained. Valveless filter bulther Permutit Company, Dept CP, 330 W. 42nd St., New York 36, N.Y. Check 1537.

#### Vertical-design collector features high efficiency and low maintenance

Units range in capacity from 3000 to 20,000 cfm

Uses: Removing dust and fumes from moving ar streams.

Features: Compact unit combines high efficiency with low maintenance and mini-



Collector's low overall height, makes it suitable for truss mounting

drawn by two fans. Heat om fluid the extended sure it is exhausted

ouilt in for with maximum 63" in height agth. Arrange-for stacking to rizontally in installations ruction is holder to surface and er metals may

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valveless fillow water fillow water fillows is described in eight-pagetion is excess filter bul — company, Dept. 2nd St., New Check 1537.

collector fficiency enance

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verall height. r truss mount

CESSING

mum operating costs. Low overall height (only 92" for 3000 cfm unit) makes collector suitable for truss mounting.

Description: Vertical-rotor dust and fume eliminator is designed to meet need for relatively low-priced, yet high efficiency wet-type dust collector.

In operation, dust-laden air is drawn into unit at side



Dust-laden air enters unit at side, leaves through exhaust blower at

(see cutaway), entering outer chamber at high velocity. Undergoing a cyclonic motion, major portion of contaminants are removed when air strikes surface of water in tank.

Air then enters inner chamber where it goes through vertical curtain of water to eliminate heavier particles. It next passes through a high velocity horizontal water curtain where fines and remaining impurities are removed. Excess moisture in air is taken out by baffles. Purified air leaves at top, being exhausted to atmosphere or returned to working area.

Collected material can be disposed of by either drag conveyor, hopper tank skimoff, or manual clean-out. Units are available ranging in capacity from 3000 to 20,000 cfm. Largest unit, with conveyor, weighs 20,470 lb (including water), holds 1030 gal water, and occupies floor space of about 120x190x195" high.

(Vertical rotor-type dust and fume eliminators are products of Schmieg Industries, Inc., Box 4701, Detroit 34, Mich.) Check 1538 opposite last page.

# Controlled dispersion for better blends

If you're coating a fine, dry material; blending liquids into a dry powder . . . or dispersing a small amount of one material into another you need more than a simple stirring, tumbling or agitating action to achieve the desired results.

In the Simpson Mix-Muller a three-way kneading, smearing, spatulate action actually coats one material with another—rather than placing them next to each other. Agglomerates are broken up, moisture or binder dispersion is thorough. You get an intensive, homogenous mix that stays mixed and will not segregate in

storage or transit. Want proof? Write for details on a confidential test. See what *mulling* can do and remember . . .

MIXING IS OUR BUSINESS

#### SIMPSON MIX-MULLER® DIVISION

National Engineering Company
640 Machinery Hall Building • Chicago, Illinois



3 WAY ACTION



Mix is wetted; dispersion of coating media begins.



As mulling proceeds, mix begins to "lump" up as moisture is dissipated.



Going! As material drys agglomerates break down under intensive mulling action.

 Gone! Components are thoroughly blended. Mix is uniform, smooth flowing...quickly achieved.



WRITE FOR Bulletin on Mulling for the Chemical and Process Industry.





## for every process need

TEFLON\*
CHEMICAL PACKINGS

Belmont Teflon Packings outlast other packings many times over in corrosive service. Good for all chemicals. Distinctive Tapered V design offers great flexibility and resiliency. Provides necessary seal at low gland pressure, reducing torque required to operate valve—imposes less load on reciprocating pump pistons. Catalog T-57.

BEL-VEE
 GENERAL PURPOSE
 PACKING

The "Pressure-Sealing" V-Ring packing that expands toward rod and stuffing box wall on pressure stroke to automatically form the seal—and relaxes when pressure is released to allow free movement with minimum friction.

For all reciprocating rods and valve stems handling water, oil, solvents, steam, air and gas. Catalog 56.

\*du Pont Trademark

The Belmont Packing & Rubber Co., Butler & Sepviva Sts., Phila. 37, Pa.

## BELMONT

Check 1540 opposite last page.



#### PLANT ENGINEERING & MAINTENANCE

. . electrical & mechanical developments

Recently developed chlorinated polyether has been used to provide extended range of service as . . .

plastic valve takes 300°F at 50 psi

Unit retains chemical resistance at higher temperatures



Diaphragm valve has body molded from recently developed plastic which extends working temperature range to 300°F

Uses: Handling a wide variety of corrosives and other materials except fuming acids, and acetone, furan, acetophenone, ethylene dichloride, or ethyl acetate at elevated temperatures.

Features: Diaphragm valve has an operating temperature range up to 300°F with 50 psi maximum working pressure at this temperature. Chlorinated polyether plastic used has exceptional dimensional stability, retains chemical resistance at higher temperatures, and pro-

vides strain-free moldability. Valve has successfully withstood hot HCl flashback in a chlorination reaction which severely damaged vinyl line.

Description: Unit has a solid plastic body with imbedded reinforcing stainless steel inserts. For optimum performance at maximum temperature with maximum chemical resistance a solid Teflon diaphragm is recommended. Sizes from ½ to 2" are available with handwheel, air cylinder, or operators for remote or

valve 45.5% lowing based tests:

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CESSING

automatic control.

Penton plastic used for valve body is approximately 45.5% chlorine with the following physical properties based on standard ASTM tests:

Tensile strength
psi (@ 73°F) 6000
(@ 212°) 3500

Flexural strength
psi (@ 73°F) 5000

Heat distortion
°F (@ 66 psi) 300

Water absorption % 0.01

It is compatible with both plastic and metallic piping.

#### Chemical structure:

Valve has no packing to leak or deteriorate. It gives positive leak-tight closure under pressure or vacuum and can be serviced, if necessary, while in place. All working parts are isolated from material flow.

(Diaphragm valve is a product of Hills-McCanna Co., 3025 N. Western Avenue, Chicago 18, Illinois)

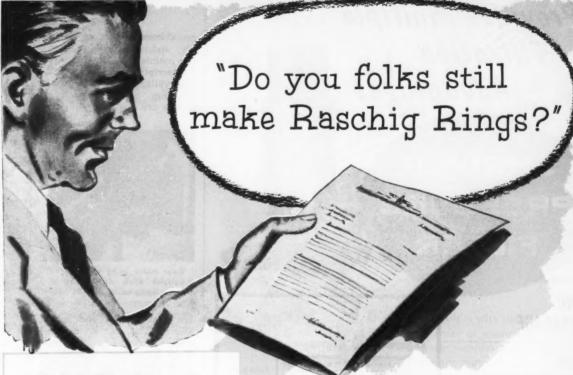
Check 1541 opposite last page.

(For more information on Penton plastic contract Hercules Powder Co., 900-940 Market St., Wilmington, Del.) Check 1542 opposite last page.

#### Gear motor saves space can be adapted over wide speed range

Compact unit combines motor and speed reducer

Uses: Power transmission applications where combination of motor and speed reducer as one unit is desirable. Features: Speed ratio of integrally mounted gear and drive motor package can be easily changed. It is adaptable over a wide range of speed



Quick Rundown on Raschig Rings:



Ceramic: We make them both in chemical stone-ware and in white chemical porcelain in some sixteen sizes from ¼"

O.D. to 6" O.D. — in standard or heavy wall.



Carbon: Eight sizes from 1/4" O.D. to 3" O.D. These rings are all carbon, no soluble filler is used. Light, strong, resistant to severe thermal shock.



Metal: Available in fifteen sizes from ¼" O.D. to 3" O.D. in carbon steel, stainless steel and aluminum. We'll admit the letter gave us a bit of a start. It went on to say: "In the last half dozen years all I've heard has been 'Intalox Saddles' . . . 'Intalox Saddles' . . . 'Intalox Saddles' . . . how much more efficient they are than rings. Can't I buy plain old-fashioned Raschig Rings any more?"

Sure, you can — and they're better than ever. As a matter of fact, we made and sold more Raschig Rings last year than ever in our history—more, even, than any other company in the business. Admittedly they don't measure up to Intalox Saddles or the newer metallic Pall Rings in performance — but many times the extra performance characteristics of the newer packings aren't needed, and the lower price of Raschig Rings makes them definitely worth using.

And there are new developments in Raschig Rings, too. In ceramics, the porcelain bodies are stronger, more resistant to spalling, possess better thermal shock properties. We have special bodies for better performance with alkalies. We make them in larger sizes, even up to six inches. And, of course, our porcelain bodies are completely iron-free, and show zero-absorption.

Yes — when the economics of the application indicate Raschig Rings — your one best source is, as always — U. S. Stoneware.

Visit Booth III

26th Exposition of the Chemical Industries New York Coliseum — Dec. 2 - 6



Write for New Tower Packing Catalog

Complete data on all Tower Packings of our manufacture. Free on request.



Check 1543 opposite last page.

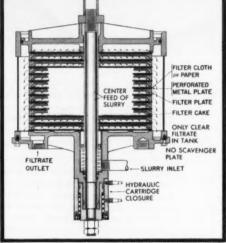


NO LEAKAGE

NO EVAPORATION

NO CONTAMINATION

## most versatile



This horizontal plate, enclosed tank type filter handles any fluid from the lightest, most volatile liquid to heavy slurries or viscous materials. It clarifies, purifies, polishes and extracts, recovers and washes filter cake and even practically dries it. Operation can be batch or continuous.

The cartridge is hermetically sealed in the tank. It permits build-up of firm, uniform cake of desired thickness which cannot break off the plates, even when run in interrupted.

There is no pressure in the tank, no unfiltered material. Flow rate is fast—up to 60 gal. per sq. ft. of filtering area per hr. Any filter medium can be used.

Removal of cartridge, cleaning and reassembly are simple, quick,

Where others have failed—the Shriver Pressure Filter has more than proved its mettle. Bulletin 138A tells how.

Filter Presses Filter Media Diaphragm Pumps Thickeners Slab Formers Electrolytic Cells

#### T. SHRIVER & COMPANY, Inc.

846 Hamilton St., Harrison, M. J.

Sales Representatives in
Decetur, Ga.—Houston, Tex.—St. Louis, Mo.—San Prancisco—Montreal—Toronte

Check 1544 opposite last page.

#### ENGINEERING

requirements. Ease of assembly and disassembly means less maintenance downtime.

Description: Gear motors are available from 1 to 10 hp. Housings, carriers, and endshields are cast iron. All gears



Gear motor being wired as an agitator drive. Application requires operation on a 24-hr basis

are heat treated and crown shaved. Magnetic drain plugs keep lubricating oil clean. Units have been designed to cover entire range of mounting requirements.

(Gear motors are a product of General Electric Co., Schenectady 5, N.Y.)

Check 1545 opposite last page.

#### **Automatic Iubrication data**

How to solve maintenance problems by changing to automatic lubrication is covered in detail in 6-page illustrated reprint. Chart shows lubrication applications in nine varied packaging operations. Bul A-7—Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N.J. Check 1546.



## the Beach-Russ

# Combination "TWO-STAGE" VACUUM PUMP



The Beach-Russ Combination "Two-Stage" Vacuum Pump gives tops in service at the low micron range.

CO

001

- Faster Pump-Down
- Faster Recovery
- Lower Blank-Off Pressure
- Conditioned Oil Supply
- For Dry or Wet Systems

Write today for NEW "Two-Stage" Bulletin 95

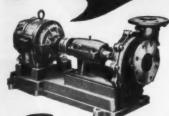
BEACH-RUSS COMPANY
50 Church St. · New York 7, N. Y

Address Department 46

Check 1547 opposite last page.

CHEMICAL PROCESSING





## SSV PUMPS

## Enclosed Impeller and Open Impeller Types

You're sure of maximum service and output with minimum maintenance or production down time with Frederick SSV Centrifugal Pumps because each pump is custom-made to fit your particular operation—whatever the consistency or type of liquid you're moving.

#### SSV PUMP FEATURES

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ives tops in

n range.

Pressure

Supply

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MPANY

ork 7, N.

ast page.

OCESSING

- Pump sizes from 1" to 4" discharge openings.
- Pump capacities from 50 up to 700
   U.S. GPM.
- Heads from 30 up to 220 feet.
- Pumps speeds can be varied to suit the driving media and operating conditions.

#### CONSTRUCTION ADVANTAGES

Pump casings are vertically split for easy accessibility. Mounted on a swivel to permit placing discharge in any desirable position. Pump openings, both suction and discharge, flanged to permit easier connection and disconnecting to joints. One-piece impellers, securely attached to shaft by stout key and lock nut, or threaded, give long service. Pump bearings mounted in sturdy frame horizontally split for easier accessibility. Extra long stuffing box provides for oversize stuffing. Mechanical seal also available for minimum leakage. Pump coupling flexible for direct connection to drivers or can be arranged for belt drive. Pump speed, pump openings, etc. are selected to suit your particular requirements.

Write for Bulletin No. 107



FREDERICK IRON AND STEEL, INC.
FREDERICK Est. 1890 MARYLAND

Check 1548 opposite last page.

OCTOBER 1957

#### ENGINEERING

## Cartridge seal assembly ready for installation, no fitting required

Perfect mechanical sealing without measurement

Uses: For pumps such as horizontal pipeline, boiler feed, and vertical pumps requiring impeller adjustment.

Features: Development provides seal assembled as cartridge unit ready for installation. No field fitting is required. With simple hand tools anyone can install or replace seal without taking measurements or referring to installation drawings.

Description: Pre-setting ring is attached to shaft sleeve collar with set-screw in slot of controlled length. "Packaged" seal is slipped onto shaft and into stuffing box.

Seal flange is bolted to stuffing box and shaft sleeve collar fastened to shaft. Presetting ring is then moved length of set-screw slot and locked in place. This places seal in precise running position with spring compressed to its proper tension.

(BJ seal with pre-setting ring is product of Byron Jackson Pumps, Inc., subsidiary of Borg-Warner Corp., Dept. CP, PO Box 2017A, Terminal Annex, Los Angeles 54, Calif. . . . or for more information check 1549 on form opposite last page.)

#### Dust-tight synthetic boot seals critical valve parts, eliminates failure

Uses: As pilot air valve.

Features: Small synthetic rubber boot which snaps in place around valve stem, seals all critical parts from dirt and abrasives, thus increasing valve life.

Description: Basic pilot air valve has five optional actuating heads — palm button, ball cam, lever, locking lever, and mechanical-link clevis. Heads are interchangeable in less than 30 seconds by removing two pins. Replacement spools take same amount of



If chronic difficulties with packing glands are demanding more than their share of maintenance time, let Allpax prescribe for you. In our complete line of mechanical packings, we are sure to have the remedy you need. If your problem is a special one, Allpax will be happy to diagnose your case and design a special packing for your particular requirement.

Allpax packings cut costly downtime to a minimum, and eliminate undue wear and tear on expensive machinery. Contact your nearest distributor or write to the Allpax Applications Consultant at our factory.

#### A complete selection of:

- **V** Teflon\* Packings
- **V** High Pressure Packings
- ✓ Metallic Packings
- **V** Plastic Packings
- **V** Sheet Packings

\*DuPont Trademark



For all your packing needs consult -

# ALLPAX PACKINGS The Purking that Parks HT

## <u>ALLPAX</u>

"The Packing that Packs All"

SEND FOR OUR CATALOG - TODAY!

A complete line of packing, tools, gasket materials

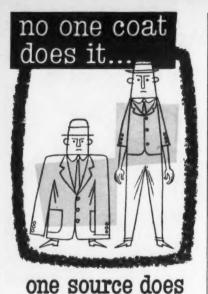
Distributors in principal cities

THE ALLPAX COMPANY, INC.

160 Jefferson Ave., Mamaroneck, N. Y.

CANADIAN DISTRIBUTORS: Albion Asbestos Packings Ltd., Montreal 18, Quebec

Check 1550 opposite last page.



Valdura offers maintenance paints made from specific resins for every condition

EPON

VAL-CHEM. Versatile, chemical resistant metal primer for use under any finish coat. VALPON ENAMEL. Prevents damage by oils, solvents, alkalies vents damage by oils, solvents, alkalies and other chemicals on wood, metal or

PARAVAL ENAMEL. Not affected by acids, alkalies and other chemicals. Used on wood, metal, concrete or ma-sonry, RUBBER BASE ENAMEL. Combines excellent exterior durability with high chemical resistance.

#### BAKELITE

SUPER SERVICE ENAMEL. Resists chemical, moisture and abrasive conditions on metal wood or masonry. ASPHALT ALUMINUM PAINT. 98% waterproof metal coat prevents rust, rot, corrosion. Highest reflectivity. COAL TAR

SEWAGE DISPOSAL BLACKS. Used for protecting concrete and metal surfaces from water, etc., found in sewage plants, reclamation projects, refrigeration systems, metal and concrete pipe, marine exposures.

URAVAL. The very latest type of coating that combines the ultimate in resistance to chemicals, solvents, marring and abrasion. Uraval will stand up where all other types of coating have failed. ALKYD

M & F ENAMEL (General Maintenance), VALKOTE (Implement Enamel), DARYWHITE. Products that utilize the outstanding durability of alkyd resins. All these coatings are hard, tough, quick drying and color resembles.

Write today on your regular letterhead for FREE catalog on all Valdura maintenance paints.



228

ALDURA HEAVY DUTY AMERICAN-MARIETTA CO.

Check 1551 opposite last page.

#### ENGINEERING

time to install. All of these parts can be interchanged without disturbing piping. Valves can be base-, panel- or wall-mounted. Used as either two-way or three-way valve, unit can be normally open or normally closed to inlet pressure, depending on piping ar-



Dust-tight synthetic boot seals valve parts, eliminates failure

rangement. Valve is built for 150 psi air operation and has pipe ports. Aluminum, stainless steel, and molded nylon are used extensively to give valve longer service life by providing resistance to corrosion.

(Flo-pilot valve is product of Hanna Engineering Works, 1765 Elston Ave., Chicago 22,

Check 1552 opposite last page.

#### FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of rticle or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

now! greater safety and efficiency in

## PUMPING CORROSIVE FLUIDS



FLEX-SEAL CENTRIFUGAL PUMPS

At last—a full line of pumps specifically designed to handle corrosive and abrasive fluids in the 1 to 80 GPM range, at heads to 75 feet.

No longer need you cut down bigger pumps in range and lose efficiency—or put up with undependable smaller pumps.

Bart pumps have fewer parts to wear or get out of order. Six models, each in corrosion resistant Type 20 Stainless Steel. Or other alloys on special order.

Write for catalog and performance curves.

Heart of the BART ... the exclusive Flex-Seal!

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the excitative Fiex-Seal!

Effectively minimizes a long-prevalent basic weakness of centrifugi pump design. Self-adjusting twear. Needs no external lubrication. Carbon stator/ceramic seat, unexcelled for long wear—or zircon filled Teflon/work-hardened Type 20 Stainless Steel, in severest corrosive service.

BART MANUFACTURING CORP. ELECTROFORMING - PIPE LINING & COATING - PLATERS - PUMPS - ENGINEERING DESIGN SERVICES 229 Main St., Bollovillo 9, New Jorsey

Check 1553 opposite last page.



THE PENNSYLVANIA PLAN:

## 100% financing for your new plant

Complete financing for Lease-Purchase of a new plant is available in laborsurplus areas of Pennsylvania through combined efforts of lending institutions, non-profit community organizations and the Pennsylvania Industrial Development Authority. Interest as low as 2%, with deferred amortization, can be applied on up to one-half of total plant cost.

100% financing is also available in other areas of the State, provided by community organizations, banks, insurance companies and other sources. You select the community you want. You specify plant construction details or choose one of several plant "shells" now being readied for completion.

100% Financing at a glance... Industrial Plant Construction Costs-

Subscribed by local non-profit community sponsored builder-owner corporations.

2nd Mortgage Loan, Pennsylvania Industrial Development Authority.

1st Mortgage Loan obtained from banks, insurance companies and similar lending institutions.

Total financing, secured through local subscriptions and mortgage loans, without cash investment by the manufacturer.

For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:

Pennsylvania Department of Commerce Main Capitol Building 913 State Street, Harrisburg, Pa. Phone: CEdar 4-2912

Check 1554 opposite last page.

IDS

ex-Seal!

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external lubricaor/ceramic sest,
long wear—
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CORP.
DESIGN SERVICES

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loans, manu-

manu-100%

7

OCESSING

#### Vibration meter useful in cramped places

Design and application simplified for easy use

Uses: For seeking out vibration and establishing acceptable tolerances in production, inspection, and maintenance.

Features: Only 24 ounces, lightweight instrument is convenient for use in even most inaccessible places. Unit operates on dry cells.

Description: Portable, selfpowered vibration testing in-



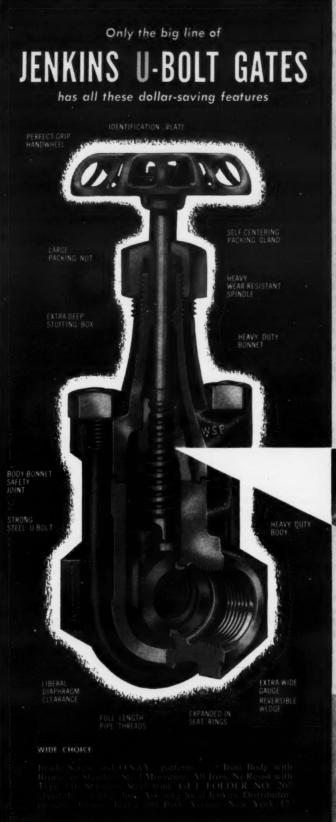
Lightweight, battery-powered vibration meter can be used in most inaccessible places

strument has been simplified in design and application so that inexperienced personnel can use it without any difficulty.

(Model 305 vibration testing meter is product of International Research & Development Corp., Dept. CP, 797 Thomas Lane, Columbus, Ohio... or for more information check 1555 on form opposite last page.)

#### Check valve bulletin

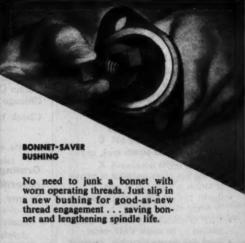
Basic check units, which can be combined with any standard pipe fitting to form a complete check valve, are described in eight-page bulletin. Form 300 — Durabla Mfg. Co., Inc., Dept. CP, 114 Liberty St., New York 6, N.Y. Check 1556.



# DESIGNED TO COST LESS TO USE

**FO** 

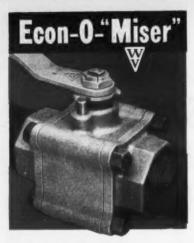
Built right into a Jenkins U-Bolt Gate Valve are dollar-saving features no other can match. Construction superiorities that equip this valve to take punishment longer . . . saving dollars in replacement bills. Features that cut maintenance time and the cost of replacement parts . . . saving more dollars. For a good example, look at the unique Renewable Bonnet Saver Bushing which is a patented feature of Inside Screw valves.



JENKINS
LOOK FOR THE ENVINS DIMOND
VALVES
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JENKINS
OF THE SENTING DIMOND
OF THE S

Sold Through Leading Distributors Everywhere

Check 1557 opposite last page.



Worcester's New Econ-O-"Miser" Ball Valve\* is BOTH

## VALVE and UNION

The costs of a union and installing it are eliminated. Add to this the longer operating life of the Econ-O-"Miser", the time and materials savings of in-line maintenance, and you get performance unmatched by any valve at any price.

The Econ-O."Miser" is available in Bronze, Aluminum, Aluminum Bronze, Forged Carbon Steel, types 303 and 316 Stainless Steel. Seat and seal materials available: Teflon, Buna-N and Neoprene (others available on request.)

The many combinations of body and seat seal materials allow handling of exceptionally wide range of media.

#### Other Outstanding Features

- · Compact for ease of installation
- · Positive leakproof shut-off
- In-line maintenance permits quick, easy inexpensive repairs
- Two-way flow allows application of pressure or vacuum to either side of valve
- Quarter turn operation readily adaptable to remote control
   Visual determination of OPEN CLOSED
- positions No manual check needed
- Round flow through the valve minimum pressure loss and turbulence
- "Wiper-action" of resilient seat against ball eliminates abrasive wear due to foreign materials in media . . . assures leak-proof seal . . . long operating life

\* Pat. Pending

Write for full particulars
WORCESTER
VALVE CO., Inc.

18 Parker Street, Worcester, Mass.

Check 1558 opposite last page.

#### ENGINEERING

#### Teflon-faced diaphragm on elastomeric backing cuts pump maintenance

Unit performs with exceptional accuracy

Uses: For proportioning and metering fluids.

Features: Teflon-faced diaphragm permanently bonded



Long diaphragm life of pump is assured by a combination of chemical resistance of Teflon with flexibility of elastomeric backing

to, and covering, face of an elastomeric backing, helps improve pump accuracy and cuts maintenance to minimum.

**Description:** Packless diaphragm pump gives continuous flow in wide output range at pressures up to 2500 psi.

(Diaphragm McCannameter Pump is product of Hills-Mc-Canna Co., 2370 W. Nelson St., Chicago 18, Ill.)

Check 1559 opposite last page.

## Grating retains rigidity regardless of cutouts in any part

Easily cleaned structure is durable under load

Uses: For heavy and versatile usage in such fields as petroleum, chemical, safety, mining, and others.

Features: Grating remains structurally rigid regardless of cutouts located in any part of panel. It is easily cleaned and provides great durability under severe load conditions.

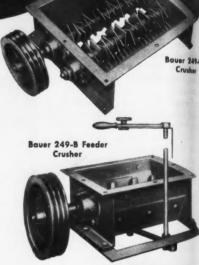
Description: Rectangular riveted aluminum grating has

## FACED WITH CRUSHING OR GRINDING PROBLEMS?

You can reduce bulky chemicals or industrial materials to a controlled, uniform, easy-to-process size with Bauer Crushers.

These units can be used independently or with Bauer attrition mills, hammer mills, breakers, granulators or fiberizers to speed the processing of virtually any type of material.

If you have a special problem in this field, the experience of our engineers and research staff is at your disposal with no obligation. You are invited to write for our No. 56 General Catalog.



#### THE BAUER BROS. CO.

1728 SHERIDAN AVE. . SPRINGFIELD, OHIO



Check 1560 opposite last page.

# for SAFE Drying of Hazardous or Delicate Materials

This recirculating steam-heated cabinet type, tray loading oven was designed for processing an explosive batch of fine crystals wet with methanol. Interior construction is all stainless steel, fume-tight; door latches and motors are explosion-proof; fans—spark-proof and corrosion-resistant.

Another example of Rockwell ovens for drying or curing process or finished materials at any required temperature, rate of heating, volume, weight and handling method.

What's your drying problem?



Rockwell ovens are available in standard bench, cabinet and truck loading types; gas, electric or steam. Also conveyor and special types.



#### W. S. ROCKWELL COMPANY

FURNACES + OVENS + BURNERS + VALVES + SPECIAL MACHINERY

2207 ELIOT STREET • FAIRFIELD, CONN.
Sales Representatives in Principal Cities

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Receiving Tubes

Test Instruments
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our 37th year

• Power & Gas Tubes

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ELECTRONIC SUPPLY GUIDE

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1958 CATALOG

your best buying guide to the world's largest stocks of

#### **ELECTRONIC SUPPLIES FOR INDUSTRY**

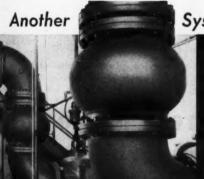
Simplify and speed your purchasing of electronic supplies and equipment: send your orders to us for fast shipment from the world's largest stocks of electron tubes (all types and makes), transistors, test instruments (see our money-saving KNIGHT-KITS), audio equipment and electronic parts. Our expert Industrial supply service saves you time, money and effort. Send today for your FREE 1958 ALLIED Catalog—your complete Buying Cuide to quality Electronic Supplies for Industrial and Communications use.

ALLIED RADIO

100 N. Western Ave., Dept. 72-K7 Chicago 80, Illinois

Send for FREE catalog

Check 1562 opposite last page.



System Made

SAFE

FRON

WATER HAMMER

Here is protection against damage from surge pressures . . . the means to eliminate resulting water hammer. They operate instantly when flow reversal starts or when flow is zero. Write for descriptive Bulletins.

Write for Bulletins No. 654 on the Valves; No. 851 on Cause, Effect and Control of Water Hammer



146 STANWIX STREET

2 GATEWAY CENTER

PITTSBURGH 22. PA.

Our 71st Year . 1886-1957

Check 1563 opposite last page.

#### ENGINEERING

been laboratory and fieldtested over five-year period to meet exact load conditions. There is 79% clear opening in rectangular design, practically



Rectangular aluminum grating is easily cleaned, provides great durability under severe load

eliminating possibility of dirt, oil, or scum accumulating in corners.

(RR grating is product of Klemp Metal Grating Corp., Dept. CP, 6601 S. Melvina, Chicago 38, Ill. . . . or for more information check 1564 on form opposite last page.)

#### Weather-protected motor

Features contributing to outdoor dependability of manufacturer's weather-protected motors, in ratings from 250 to 900 hp, are described in 6-page bulletin. Bul 51B8606A—Allis-Chalmers Mfg. Co., Dept. CP, PO Box 512, Milwuakee, Wis. Check 1565.

## Greases made more stable with thickening agent

Uses: As multi-purpose industrial greases.

Features: Greases have been made very stable by use of a non-soap thickener.

Description: Greases using thickening agent give lubrication at high temperatures over long periods. ASTM dropping point is 480°F. Four regular greases and three extreme pressure grades are available.

(Rykon greases are product of Standard Oil Company (Indiana), Dept. CP, 910 S. Michigan Ave., Chicago 80, Ill. . . . or for more information check 1566 opposite last page.)

# THOMAS FLEXIBLE COUPLINGS PROTECT Your Pumps



Pump troubles such as replacement of packing glands and bearings are practically eliminated when Thomas Flexible Couplings are used.

There is a THOMAS Coupling for every purpose.



UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

- No Cross-pull on Bearings or Gland.
- 2 No End-thrust on Bearings or Impeller.
- 3 Freedom from Backlash Torsional Rigidity.
- 4 Free End Float.
- 5 Smooth Continuous Drive with Constant Rotational Velocity.
- 6 Visual Inspection in Operation.
- 7 Original Balance for Life.
- 8 No Lubrication.
- 9 No Wearing Parts.
- 10 No Maintenance.

Write for Engineering Catalog 51-A

## THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U. S. A.

Check 1567 opposite last page.

ble in stand-

uck loading

steam. Also

PAN

MACHINERY

OCESSING

JNN.



Check 1568 opposite last page.



Check 1569 opposite last page.



Compact, self-contained boiler has given reliable service in continuous operation since installed in 1948 except for annual plant shutdown.

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pan Lea

Par

Moved from plant-to-plant when required, easily converted from hot water to steam service, plus reliable operation have shown The Richardson Co. that . . .

## Self-contained Boiler Proves its Worth on Job

THEODORE W. WETT, Assistant Editor With R. S. PAULSON, Manager of Engineering The Richardson Co., Melrose Park, Illinois

Flexibility, reliability, and compactness are but three of many advantages found for an automatic, oil-fired "packaged" boiler by The Richardson Co. in their far flung battery case and plastic laminate manufacturing plants. I mportance of packaged feature was practically demonstrated when Richardson's Ogden, Utah, plant outgrew installed boiler capacity in 1955. Facilities at Newnan, Ga., required

a boiler just this size. Because packaged boiler was a completely contained unit, it was possible to remove the boiler and ship it directly to Newnan on a flatcar. A larger boiler was then installed in Ogden plant. Entire operation, removal of smaller boiler and installation of larger unit, was accomplished in space of one weekend. Plant shut down Friday at midnight and new boiler was ready for serv-

ice Monday morning with no loss in production time.

At company's Newman Georgia, and Ogden, Utah, plants the original boilers were installed as hot water generators with a closed circuit pumping system. Desired temperature was achieved by mixing cool return with fresh hot water. When processing changes brought a demand for various temperatures in 1951, these units were switched from hot water to steam. Complete conversion required only three to four hours.

Installation is completely reliable, operating continuously 50 weeks a year. Peak demand at Newnan is 8000 lb/nh with normal load less than 2000 lb/nr. Units are each 125 hp, oil-fired, and supply 150-psi steam. Operation is automatic and trouble free with minimum maintenance. Boilers are cleaned each year during plant shutdown and simple firing controls checked. Plant engineers report that fuel system is easy to service.

reliable service

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CESSING

1948 except

Boiler is a four-pass, horizontal-firetube unit mounted on a heavy steel frame with burner, pilot ignition system. and forced draft blower. All necessary fittings, including feed control, pressure gages, and safety valves are furnished mounted and installed. Complete unit is approved by Underwriters' Laboratories and all controls and wiring are in conformity with the National Electrical Code. Electronic flame failure device assures safe operation.

(Self-contained boilers were supplied by Cleaver Brooks Co., Milwaukee 12, Wis.)

Check 1570 opposite last page.

#### flexible hose bulletin

Data and prices of flexible hose and retractable ducts for moving air, dust, fumes and materials by pressure, suction, or gravity are contained in an 8-page bulletin. Tabbed for easy reference, bulletin illustrates many uses of hose and duct. Bul 70—Flexaust Company, Div. of Callahan Zinc-Lead Co., Inc., Dept. CP, 100 Park Ave., New York 17, N. Y. Check 1571.

Alumalife® Case Phenal Case FOR PROMPT ASSISTANCE in selecting the right Ash-croft Duragauges for your specific needs, depend on the experience of your Industrial Supply Distributor. He is as close as your

Why do ASHCROFT DURAGAUGE

## CASES

#### increase service life?

Duragauge casings add extra-long service life to Duragauges because they're available in three different materials: you can choose the casematerial that stands up best in your application. You have a choice of Alumalife®—a special aluminum alloy; Cast Iron, rugged and durable; and Phenol, a tough, rigid plastic.

Duragauge casings are dust and moistureproof. Chrome-plated, die-cast retaining rings keep the dial cover glass tightly in position and prevent the entrance of dirt or harmful fumes. Depending upon material, casings are Bonderized and the ring is Anodized and dichromate sealed for protection from corrosion.

For added protection, there is the Maxisafe Duragauge casing with a solid front — a special design for maximum safety and ease of maintenance. Duragauges are easy to service since Duragauge casings are constructed so that the entire system — socket, tube, tip, movement, dial and pointer—can easily be removed as a unit.

Lifetime Duragauge cases are available for numerous dial sizes. You have a choice of Bourdon tube materials, a wide range of pressures, and a movement made completely of stainless steel or stainless steel with nylon bearings and pinion gear.

Whatever case material and gauge system is best for your needs, you can rely on the Ashcroft Duragauge for highest sustained accuracy and long service life.

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

#### HCROFT GAUGES

A product of MANNING, MAXWELL & MOORE, INC. STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 
'AMERICAN-MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, Stratford, Conn. 'HANCOCK' VALVES, Watertown, Mass. 
'CONSOLIDATED' SAFETY RELIEF VALVES, Tulso, Okla. AIRCRAFT CONTROL PRODUCTS, Danbury & Stratford, Conn. and 
Inglewood, Calif. "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING 
SPECIALTIES, Muskegon, Mich.

G4-5

Check 1572 opposite last page.

#### Twisted wire brush up to 8' in length for industry, lab

Uses: As tube cleaners, turbulators, stirrers, heat exchangers, static eliminators, filters, and power brushes for processing.

Features: Brushes come in

lengths up to 8'.

Description: Twisted wire brush diameters can be from  $\frac{1}{4}$  to 8", precision made to  $\pm 0.001$ ". Brush may have single or double spirals of bristles. Fill material may be hog bristles, fiber, nylon, steel. brass, bronze, or stainless.

(Twisted wire brush is product of Mill-Rose Co., Dept. CP, 1985 E. 59th St., Cleveland 3, Ohio . . . or for more information reader may simply check 1573 on form which is located opposite last page.)

#### Solve flow control problem in poly plant reactor

Lubricated plug valve stops leakage, resists wear

Problem: Esso Standard Oil Company, was recently faced with valve failure situation in controlling flow through polymerization plant reactors at its Bayway refinery, Linden, N.J. Plant utilizes twelve reactors. Feed leaves pumps in 4" line which spilts to 3" inlet manifold headers for each bank of six reactors. From headers, 3" lines are taken off to each pair of reactors, with 3" valve used at each line to throttle flow to assure even reactor feed.

Downstream of valve, line splits and feeds through two 2" valves to each single reactor. First valve is used only as block valve, second is throttling valve to continue even feed process.

Valves are subjected to extensive throttling as well as to shut-off service. One valve may be cracked as often as six times a shift, while another may remain in full-open position for long periods of time. When valves are closed, as in reactor turnaround, they must be capable of tight, positive shut-off, without galling or

# Can business publication

By reputation, salesmen are reluctant to credit anything but their own selling efforts for getting names on the dotted line.

Actually, it's quite a different story. The most successful salesmen will tell you two important things about selling. 1. That the selling process is largely a matter of communicating ideas. 2. And that specialized business publication advertising can help importantly to register information with prospects.

Of course each salesman will express this in his own way...but they all agree that selling would be far more difficult without the advertising that appears in the industrial, trade, and professional publications that serve the specialized markets to which they sell.

Here, for instance, is what three salesmen say about this kind of advertising:



William W. Cox sells to industry AMP, Incorporated

#### Says Mr. Cox:

"The quickest way we can introduce a product is by introducing it through advertising in business papers. That way we get it around faster than we can by word of mouth alone. On occasion my home office has inquiries out to me before I can get to the customer or prospect to introduce a new product. They've already seen it in a trade magazine.

"It's interesting to note that within the last two weeks I received a survey which shows about 80% of the new customers we get on our books comes through our trade publication advertising. Of course, our company is only 15 years old and we have grown from what you might say, nothing, to the biggest in our business. Certainly a lot of that has come from our advertising campaigns. Our name is known throughout the world right now, purely because of our advertising program. When I go to a prospect now, they know my company, they know my product . . . it makes my job easier, and opens doors when I have to make cold calls."



George A. Ecclesine Gerberich-Payne Shoe Co. sells to retailers

#### Says Mr. Ecclesine:

"We couldn't get along without trade advertising in the boy's shoe business. I'll tell you why.

"Ours is not a big shoe company but we have to cover the whole country. There are just ten salesmen. Most of our business is done with the smaller retailers and you can see that we are not able to call on any one retailer too often. But our advertising can call on these fellows every month. We know that they see the ads and read them because they know who we are when we walk in the door and they're ready to start talking about the very things that have appeared in our ads.

"For instance, we had an idea that the boy's shoe business was being neglected by the general clothing store or the general shoe store, and was drifting to the men's shoe stores. To dramatize this concept of business being lost we started running a series of initials at the foot of our ads. They read BSB-FMB.

"People in the trade started asking about these initials and the mystery was built up to a climax at the shoe convention in Chicago that year. There we made it known that the initials stood for 'Boys Shoe Business is Future Men's Business.' The idea really caught on. As you can see, the whole build-up was made, quite inconspicu-

## tio dvertising actually sell?

ously too, in our trade advertising. That's just one example of how much we know these trade ads are read, and what a job they are doing for us."



Fred Snyder, Cleveland District Worthington Corporation

sells to industry

#### Says Mr. Snyder:

"We have, of course, sales leads from our business paper advertising that are forwarded to us on a monthly basis. But also the trade advertising has its impact on many who do not at the time request specific information. Worthington is far better known today than it was five years ago, due in no small measure to the aggressiveness of its advertising and sales promotion department.

"Their work makes my job easier. First of all, we have an entree in companies where some Worthington products were not previously as well-known as our original line. We're getting a lot better sales coverage on all products. The Corporation manufactures so many products to-day that even regular customers may be unfamiliar with some of these products. Through trade advertising and sales promotion we have been able to sell the whole Worthington line.

"Getting back to sales leads—they are particularly helpful to our dealers. In Cleveland, W. M. Patterson Supply will undoubtedly receive inquiries from Worthington's advertising. Scott-Tarbell, Inc., Cleveland Oak Belting, or other dealers handling special product lines will pick up leads from our advertising to help them get business.

"I think we've grown eightfold since the war. This year we hit two hundred million. It used to be that twenty-five million was a good year. The advertising and sales promotion department has aggressively been attacking their part of the problem within the last five years. Prior to that the name Worthington was not nearly so well known and we put much less emphasis on advertising."

Ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

### How salesmen use their companies' advertising to get more business

Here's a useful and effective package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet entitled, "How Salesmen Use Advertising in Their Selling," which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' advertising.

HOW SALESMEN USE BUSINESS PUBLICATION ADVERTISING IN THEIR SELLING You'll find represented many interesting variations in how they do this. Some are very ingenious; all are effective. You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods.

The coupon is for your convenience in sending for your free copy. Then, if you decide you want to provide your salesmen with additional copies, they are available from NBP Headquarters in Washington, at twenty-five cents each. Or if you choose you can reprint the material yourself and widely as you please. But first, send for

distribute it as your free copy.

#### NATIONAL BUSINESS PUBLICATIONS, INC.



... each of which serves a specialized market in a specific industry, trade or profession.

NATIONAL BUSINESS PUBLICATIONS, INC. Department 1A 1413 K Street, N. W. Washington 5, D. C. STerling 3-7533

Please send me a free copy of the NBP booklet "How Salesmen Use Advertising in Their Selling."

Title
Company

Street Address

City

Zone State

seizin

Besides this variety of service, valves are subjected to continuous high pressures and temperatures. Leakage initially developed from minute quantities of catalyst in outlet stream lodging in seats of valves on outlet manifold, impairing shut-off qualities.

Solution: Lubricated plug valves were installed on inlet and outlet lines to reactors.



Lubricated plug design for throttling valve was chosen to withstand high pressures and corrosive fluids, and to protect valve seating surfaces from reactor catalyst

In this type of valve, seating surfaces are removed from line of flow and valve core is a strong, tapered steel plug.

First lubricated plug valves were installed in Oct. 1955, on test basis. Further valves were installed in Jan. 1956, and reactor section was equipped with additional valves in June, 1956. In all, approximately 115 lubricated plug valves of 1 to 3" size were installed.

Results: After one year of normal reactor operation, Bayway operators report that leakage is no longer a problem. None of the operating valves show signs of wear. Maintenance problems have been reduced to simple program of periodic lubrication, done while valves are in service.

(Rockwell-Nordstrom Hypreseal valve is product of Rockwell Mfg. Co., Dept. CP, 400 N. Lexington Ave., Pittsburgh 8, Pa. . . . check 1574 on form opposite last page.)

CESSING



## **Industry Looks To AMERICAN AGILE**

- During the many years AMERICAN AGILE has worked in corrosionresistant plastics, its outstanding reputation was built upon its per-formance in research, development and quality controlled production of plastics for the chemical process ndustries.
- In 1949 as one of the nation's first commercial processors of polyethylene, American Agile evolved the techniques of molding and fabricating the plastic.
- · In 1950 Agile introduced the spraying and forming of polyethylene structural shapes to meet operating conditions in which other materials failed. Also, Agile intro-duced coating of metal targets with modified polyethylene.
- In 1951, welding of polyethylene and polyvinyl chloride was intro-duced in this country by Agile which then made the techniques and the welding equipment available to other processors.
- In 1954 another Agile first was the introduction of irradiated polyethylene molded parts whose range of industrial applications was en-larged through the exposure to atomic radiation.
- · AND TODAY with still another first in foam polyethylene and polyethylene filter cloth for high temperature applications, American Agile is expanding both research and production to meet the demands of cost-conscious, progressive thinking designers, engineers and management for more efficient produc-tion equipment for better quality products at lower cost.

What Are Your Needs? Whatever your product may be, you will find American Agile a prime dependable source of supply for your processing equipment requirements.

Write for literature.

Established in 1932

#### AMERICAN AGILE CORPORATION

5461 Dunham Road . Maple Heights, Ohio

Check 1575 opposite last page.

#### Gate and globe valves good for temperatures as low as -425°F

Uses: For low temperature service

Features: Units are designed to operate at temperatures as low as -425°F.

Description: Stainless steel (304) gate and globe valves with screwed, flanged, socket, or butt weld ends have extended bonnets. Heavy tubular section is welded between bonnet and upper yoke assembly. Distance from centerline of valve to base of stuffing box may be varied to suit cold box requirements. Round bonnet permits use of retained bonnet gasket.

(Gate and globe valves are property of Alloy Steel Products Co., Dept. CP, Empire State Bldg., New York 1, N.Y. ... check 1576 on form opposite last page.)

#### Find ground faults quickly and clear from line with detector

Test button impresses steady signal current up to 22 amps

Uses: For finding electrical ground faults.

Features: Device permits ground faults to be found quickly and cleared from line without shutting down power. Unit impresses steady signal



detector tests grounded and modified grounded circuits while "hot" and with equipment operating

### ON THE SPOT HEAT

to your exacting requirements!



## TRENT HEATERS

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fo

for Ovens, Dryers, Kettles, Process Equipment

- Ceramic Block Terminal Blocks Flat Metallic Tube Casing
- Available in a complete range of types and sizes, wattage requirements, and voltage conditions—for maximum safe surface temperatures of 750°F, and 1000°F.



#### TRENT CARTRIDGE HEATERS

fer Dies, Molds, Platens, Sealers, Defrosting

- Brass or Steel Sheath
- Construction
  Silver Soldered End
  Opposite Terminals
  Moisture and Wax
  Resistant
- Nickel Chromium Heater Coil Sealed in Ceramic Insulation
- Brass Angle, Pigtail, Rod, or Stud Type Terminals

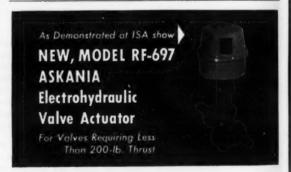
Standard sizes from  $\frac{1}{6}$ " to  $1\frac{1}{16}$ " diameter, and  $1\frac{1}{2}$ " to 22" in length, are supplied in a range of wattage requirements for 110 and 220 volt operation.

Discuss your spot heating requirements with a Trent epresentative.

Trent Representatives in Principal Cities Coast to Coast



Check 1577 opposite last page.



The Askania Model RF-697 Electrohydraulic Valve Actuator comprises a self-contained unit designed for proportional-position control, using signals from an electronic controller, manual station or directly from a measuring element.

Operates from low level a-c and d-c signals. Major advantages are stability, fast response, dependable operation and ABSOLUTE MINIMUM MAINTENANCE. Operates directly from controller...mechanically simple...easy to install...competitively priced... explosion proof... used for control of flow, temperature, pressure and other variables in closed or open loop systems...Write for Bulletin No. 38.3 to Askania Regulator Company, 242 E. Ontario St., Chicago, Illinois.

ILA BEGULATOR COMPANY A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

Check 1578 opposite last page.

ments! ENT RIP TERS

inal Blocks nents, and volt-F. and 1000°F!

**ITERS** Defrosting

romium Heater ed in Ceramic le, Pigtail, Rod, ype Terminals nd 1½" to 22" e requirements

PHILA 27 PA

ulic Valve designed nals from r directly

ds. Major ependable ENANCE. hanically priced... temperaor open 38.3 to tario St.,



CESSING

current of up to 22 amps which can clear high resistance or arcing faults, or make them solid and easy to locate.

Description: Detector consists of mobile generator and hand-held signal receiver. Generator impresses pulsating signal of line voltage on grounded phase conductor. Signal is followed visually with receiver to ground fault where meter stops pulsating. Detector tests ungrounded and modified grounded circuits from 0-2300 volts AC or DC.

(Ground detector is product of Excel Electric Service Co., Dept. CP, 2113 S. Western Ave., Chicago 8, Ill. . . . or for more information check 1579 on form opposite last page.)

#### Worm-gear drives

Finger-tip facts on company's line of speed reducers, wormgear sets, and special units are contained in 16-page bulletin.

Bul 145 — The Cleveland Worm & Gear Co., Dept. CP. 3249 E. 80th St., Cleveland 4, Ohio. Check 1580.

#### **Electrical insulation** has dual features of metal, plastic

Thermoset casting resins of polyester and epoxy types have been shaped and bonded to metal to provide an electrical insulating medium. Insulated bushings shown have been treated on rounded edge to prevent wear and provide insulation for wires leading



Treated edges prevent wear, provide insulation

how would you like to add \$250,000.00 to your profit?



**Dowell Chemical Cleaning Made** This Possible for an Industrial Plant!

In 1954 an East Coast plant employed Dowell Chemical Cleaning Service on a limited basis. The results were encouraging.

In 1955 the same company expanded its use of chemical cleaning. The results were startling. More throughput, less down time, and greater overall plant efficiency effected nearly a \$250,000.00 saving!

> In 1956 the program was continued. The result: still more savings. Eventually, chemical cleaning on a continuing yeararound basis is expected to effect savings of from \$300,000.00 to \$500,000.00 annually.

This case history is about an oil refinery. However, Dowell has eye-opening performance data to show you in almost any industry.

Dowell engineers are experts in the use of solvents to remove scales and sludges-those deposits that cut the capacity of process and steam generating systems. Dowell does the job for you and furnishes all necessary chemicals, trained personnel, pumping and control equipment.

For additional information, call the Dowell office near you. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

clean it chemically



A SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Check 1581 opposite last page.



## Technochook: PVC WILL LAST THE LIFE OF ANY PVC LINE!

Technocheck is an exclusive valve principle developed and controlled by Techno Corp. It is employed in polyvinyl chloride and in a variety of metals as well.

In polyvinyl chloride, Technocheck is as resistant to corrosive gases, vapors and fluids as the piping system itself because the entire valve is made of PVC.

Valve is rugged, versatile, tight sealing and operates on low pressure differential. Made in size from 1" to 8" with flanged or threaded ends. Write for Bulletin: Technocheck-PVC.



Check 1582 opposite last page.





Continuous records of the oxygen dissolved in boiler feed water and of the hydrogen entrained in steam, indicate when corrective measures are necessary to prevent otherwise unsuspected and costly corrosion. Cambridge Analyzers measure and record dissolved oxygen directly. The hydrogen in the steam is measured and indicates the quantity of oxygen set free by dissociation. Cambridge instruments are available for continuously recording either O<sub>2</sub> or H<sub>2</sub> separately, or O<sub>2</sub> and H<sub>2</sub> simultaneously.

Send for Bulletin 148 B. P.

#### CAMBRIDGE INSTRUMENT CO., INC.

3512 Grand Central Terminal • New York 17, N. Y.
PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 1583 opposite last page.

#### ENGINEERING

from box on which bushings are used.

Continued use of metal parts for their strength and secureness, plus wear resistance and high dielectric qualities of plastics are features of this insulation.

(Plastic insulation for metal is product of Biwax Corp., Dept. CP, 3445 Howard St., Skokie, Ill. . . . or for more information check 1584 on form opposite last page.)

#### Package drive units

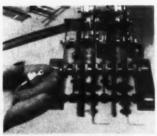
How manufacturer's package drive unit is meeting many industrial requirements for DC power to make possible higher flexibility of machines and equipment is told in 8-page bulletin. Bul 51B8166A—Allis-Chalmers Manufacturing Company, Dept. CP, Milwaukee 1, Wis. Check 1585.

#### DC currents to 35 amps and 22 amps halfwave, with silicon rectifier

Peak inverse voltage up to 600 volts

Uses: For supplying direct current from alternating current source in power transmission equipment applications.

Features: Cells provide DC current up to 35 amps and 22



Silicon rectifiers are available in complete bridge assemblies

amps halfwave. Maximum peak inverse voltage is up to 600 volts.

Description: Two silicon power rectifiers are available in complete bridge assemblies. Forward voltage drop of cell

## Protects Metals at Red Hot Temperatures!



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Heatproof Coating Stops Corrosion, Scaling and Oxidation

MARKAL "S-R" Coatings were developed to protect metals, graphite or carbon parts against

scaling, corrosion, oxidation, or carbon and hydrogen penetration at temperatures up to 2200°F. MARKAL "S-R" Coatings are excellent for the protection of stacks, radiant tubes, retorts, carburizing grids, mufflers, manifolds, etc.

MARKAL "S-R" Coatings will not peel or crack at high temperatures and are not affected by rapid heating and cooling cycles.

MARKAL Coatings are manufactured in a complete range of types for specific applications. Write for a free copy of Catalog MPC. The MARKAL COMPANY, 3055 W. Carroll Ave., Chicago 12, Illinois.

Check 1585A opposite last page.



It's an article in CHEM-ICAL PROCESSING describing a new way of

solving a tough plant operating problem. In each issue you will find specific "case histories" showing how these processing problems were solved. Each article states the operating problem . . . explains the process used and gives details of how problem was solved . . . shows results secured.

Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.

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CESSING

302 will not exceed 0.9 volts at forward current of 10 amps in ambient temperatures of 25 to 35°C. Reverse leakage of cell is a maximum 20 milliamps at rated peak inverse volts and maximum temperature. Maximum operating junction temperature is 190°C.

For cell 303, forward voltage drop will not exceed 1.2 volts at forward current of 10 amps in an amibent temperature of 25 to 35°C. Reverse leakage is a maximum 10 milliamps at rated peak inverse volts and maximum temperature. Maximum operating junction temperature is also 190°C. Each cell weighing 0.65 ounces is shipped with hex nut, lock washer and flat washer, two 0.003" thick mica washers and an insulating bushing.

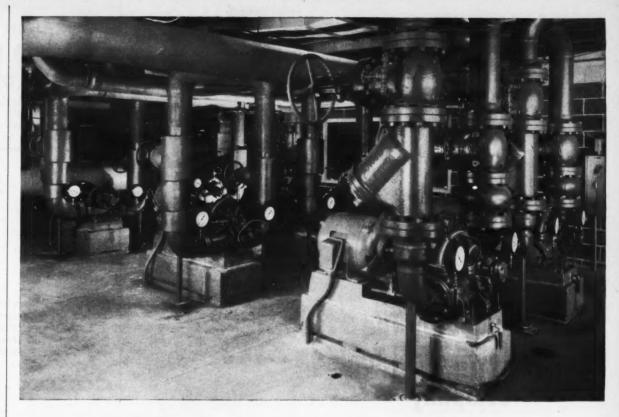
(Models 302 and 303 silicon rectifiers are products of Westinghouse Electric Corp., PO Box 2099, Pittsburgh 30, Pennsylvania.)

Check 1586 opposite last page.

#### flexible metal hose

Recommended pressures, temperatures, and specific uses for manufacturer's line of flex-ible-metal hose are discussed in 10-page catalog. Cat 1D-100A — Universal Metal Hose Co., Dept. CP, 2133 S. Kedzie Ave., Chicago 23, Ill. Check





### How do you guarantee successful pump installations?

#### Many rely on these "Buffalo" Pumps

There's a "Buffalo" Pump that's sure to fit your installation needs perfectly . . . sure to deliver the utmost in economy, reliability and long-lasting performance on the job. For two reasons: First . . . "Buffalo" builds a line of pumps covering almost every type of liquidmoving requirement. All you do is select the one "Buffalo" Pump that exactly matches your installation needs. Second . . . When you choose your "Buffalo" Pump, you can be sure you're installing the very finest. For more than 80 years, engineers and contractors have relied on the rugged, dependable quality built into every "Buffalo" Pump. You can depend on "Buffalo" Pumps.

Whatever your pump problem, write us for engineering data. We'll gladly submit recommendations that will help you with your liquid-moving requirements.

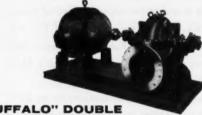


#### UFFALO PUMPS

Division of Buffalo Forge Co. 524 Broadway Buffalo, N.Y.

Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



"BUFFALO" DOUBLE SUCTION PUMPS

These pumps are designed for the finest performance possible in clear water service in 10 to 14,000 gpm capacities. Widely used for air conditioning service, because of their peak efficiency. Write for Bulletin 955-Q.



#### "BUFFALO" SINGLE SUCTION PUMPS

Husky pumps for husky jobs, with these outstanding features: oversize bearings capable of handling speeds up to 5000 rpm — sealed-in bearing housing to ep out foreign matter—enclosed keep out foreign matterimpellers, to retain initial efficiency. Complete details in Bulletin 976-E.

#### "BUFFALO" MULTISTAGE PUMPS

"Buffalo" Type "RR" Multistage Pumps are highly efficient for high pressure applica-

Ideal for boiler feed service. Available in two and four stage designs, up to 900 gpm and 500 lbs. Write for Bulletin 980-D.

Check 1588 opposite last page.

## another Custom-Built Vessel



## fabricated by The Youngstown Steel Tank Company

This is one of two styrene stripping towers we have recently completed for The Goodyear Tire & Rubber Company. Both towers will be installed in Goodyear's Akron synthetic rubber latex plant.

The towers are 9'0" in diameter by 55'1" high, operating at 30 lbs. pressure and at full vacuum. All welding is ASME code approved and X-ray examined.

These styrene stripping towers are only one example of nearly 1,000 different products that will be custom fabricated by The Youngstown Steel Tank Company this year.

Write us today about the steel plate products you are buying. Our sales, engineering, and production departments will welcome the opportunity to serve you.



The YOUNGSTOWN
STEEL TANK
COMPANY

Youngstown, Ohio

Check 1589 opposite last page.

#### ENGINEERING

## Operate valves manually with remote controls when power falls

Controls can be disconnected without special tools

Uses: For two-way pneumatic or hydraulic remote and sequence ball valve operation.

Features: Device permits manual operation of valves in case of power failure. It can be disconnected without special tools should air or hydraulic lines need servicing or should change to manual operation be required.

Description: Air or hydraulic remote operator for ball valve is front-end mounted in spherical bearing to absorb thrust load and permit motion. Steel plate connects cylinder bearing to valve. Piston



Remotely controlled air or hydraulic ball valve operator permits manual operation in case of power failure

rod strokes provide exact open and shut position.

Speeds range from ½ second for ¼" valve, to ¾ second for 1¼ to 4" valves. Speeds can be increased or decreased. Operator can be used with manufacturer's standard stainless steel, bronze, carbon steel aluminum, or PVC ball valves from high vacuum to 2000 psi pressures.

(Remotely controlled operator is product of Jamesbury Corp., Dept. CP, 45 New St., Worcester, Mass. . . . or for more information check 1590 on form opposite last page.)

#### Electromagnetic control

Comprehensive catalog of 170 pages covers manufacturer's equipment for electromagnetic control. "Electro-magnetic Control" — Automatic Switch Co., Dept. CP, Florham Park, N.J. Check 1591.

## New Compact CONCX® THERMOCOUPLE HEAD with

- Light weight design
- Simple assembly
- Watertight construction
  Bright chrome finish
- Corrosion resistance

#### for

use with 30 gage to 14 gage wire—maximum operating temperature of +300°F. (continuous) or +450°F. (intermittent). Ideal with Conax Thermocouple Glands, Conax Speedwells, Conax Flex-tube Assemblies, Conax Safetywells and other similar applications.





WRITE FOR CONAX DATA BOOK SHOWING COMPLETE LINE OF THERMOCOUPLE AS-SEMBLIES AND PRESSURE SEALING GLANDS.

conax

corporation

2314 Walden Ave., Buffalo 25, N.Y.

Check 1592 opposite last page.



Check 1593 opposite last page.

CHEMICAL PROCESSING

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more information

opposite last page.

on product at right, specify 1594 see information

request blank

d in industry

CESSING

# New...LARGER...ALL-STEEL! -the FALK 3 5 Shaft Mounted Drive

- o for higher horsepower
- o for lower output speeds



THE NEW 315J ... FROM 2 HP AT 5 RPM TO 50 HP AT 359 RPM

#### Check These Features

3-wall, one-piece housing provides double the ability of cast iron to withstand external impact or shock loads.

ratio range-5:1, 14:1 or 25:1. Higher ratio range makes possible lower output speeds...smaller sheaves...standard, rather than slow-speed, motor.

ease of maintenance. All revolving elements can be easily replaced in the field, on the jobsite! Inspection covers permit quick inspection of gears and bearings. Dipstick provides quick check on lubricant.

longer center distance between shafts allows use of larger sheave on input shaft. Unit may be mounted with input shaft next to driven machine, and with motor mounted directly under driven shaft.

#### PROMPT DELIVERY

Standard units are available for off-theshelf shipment from factory, warehouse or distributor stock.

#### LET US HELP YOU

Your Falk Representative or Authorized Falk Distributor will gladly review your applications and offer suggested selections-without obligation.

Write for Bulletin 7100

... a good name in industry

## The new Falk 315J also gives you these famous Falk advantages-

- Falk extra-depth, extra-capacity gear teeth—plus the extra efficiency (981/2% per gear mesh) of helical gears for maximum power utilization.
- Through-hollow shaft design for easy installation, with internal groove to permit use of bearing puller when dismounting unit. Hollow shaft also permits use of unit on through-shaft applications.
- Tie rod fastened to steel housing by steel bracket with bolt in double shear. Shock load on tie rod will not damage housing.

#### THE FALK CORPORATION, MILWAUKEE I, WISCONSIN

Representatives and Distributors in Most Principal Cities Manufacturers of Quality Gear Drives and Flexible Shaft Couplings



# is ready to mail to you

12 pages of data on Niagara vertical leaf pressure filters for liquid clarification and solids recovery. Completely new bulletin contains sections on . . . how these filters operate . . . which model you need . . . design features and modifications . . . leaves . . . accessories . . . sizes, capacities, dimensions . . . and special Niagara services. It will come to you by return mail.

- SEND FOR YOUR COPY NOW --

A DIVISION OF

American Machine and Metals, Inc. Dept. CP-1057, EAST MOLINE, ILLINOIS

Niagara Filters Europe: Kwalkelpad 28, Alkmaar, Holland

Yes, mail 1 copy of your new 12-page catalog for me and .......

copies which I'll give to my interested associates.

NAME AND TITLE

CITY

SPECIALISTS IN LIQUID-SOLIDS SEPARATION

STATE

ZONE

Check 1595 opposite last page.



# briefs

Abstracts of pertinent articles in other industrial publications ... selected by CP editors as a service to you

#### Radiation and health

Atomic radiation and human health are considered by the director for medical education of the Rockefeller Foundation. Six pages, seven references. ("American Journal of Public Health," June 1957, page 682.)

#### Hydrogen peroxide

Field transportation of concentrated hydrogen peroxide is covered. Methods of handling hydrogen peroxide commercially and requirements of its tactical service vehicles are discussed. Two pages, four figures, four references. ("Jet Propulsion," June 1957, page 663.)

#### **Drinking** water

This report points to natural substances as well as industrial wastes as factors in taste and odor of drinking water. Five pages, nine tables. ("Water and Sewage Works," June 1957, page 243.)

#### Gas chromatography

Silica gel columns are compared with alumina columns for use in connection with gas adsorption chromatography. One page, two figures, two references. ("Analytical Chemistry," July 1957, page 1055.)

#### **Quality control**

This paper deals with the essential elements and procedures required to sell quality control to management. Three pages. ("Industrial Quality Control," July 1957, page 5.)

#### **Embrittlement of steel**

Hydrogen sulfide embrittle. ment of steel was compared with that caused by cathodic changing. Hydrogen absorp-tion by iron-nickel alloys from hydrogen sulfide was compared to that from sulfuric acid. The rates of permeation of hydrogen through austenite, martensite, and ferritic states of iron-nickel alloys are reported. Twenty-two pages, seven tables, 41 figures, 43 references. ("Corrosion." July 1957, page 437.)

#### Control of noise

The control of noise by sound absorbent materials is covered. Properties of types of sound absorbers, control of reverberation, and the role of sound absorbent materials are considered. Ten pages, ten figures, 11 references. ("Noise Control," July 1957, page 11.)

#### New pulping methods

A new continuous cooking system for chemical and semichemical pulping of wood is described. Cooking in the vapor phase is featured. Five pages, three figures. ("Paper Trade Journal," June 24, 1957, page 44.)

#### Mineral concentrator

Under headings of crushing, grinding, flotation, concentrate dewatering and handling, and disposal of tailings, the operation of a mineral concentrator is described. Eight pages, seven tables, 15 figures. ("Canadian Mining and Metallurgical Bulletin," June 1957, page 362.)

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#### friction of Rubber

In this study of the friction of rubber on rough surfaces, a mechanism is proposed by which rubber lost is used in predicting the merit of tread materials. Six pages, eight figures, nine references. ("Rubber Age," July 1957, page 613.)

#### Peaceful atoms

Libby, of the US Atomic Energy Commission, discusses chemistry and peacetime uses of the atom under headings of place of plutonium, costs of atomic power, and isotopes and human life. Four pages, seven photographs. ("Chemical and Engineering News," May 6, 1957, page 14.)

#### **Silicones**

In connection with silicones in the protective coatings industry, this paper covers water repellents, electrical insulating corings, additives for correcting film defects, and heat-resistant enamels. Five pages, six figures. ("ASTM Bulletin," May 1957, page 30.)

#### Pure hydrogen

This description of a plant that produces 95 mole per cent hydrogen is presented under headings of reformer furnaces, purification, products, utility requirement, and materials of construction. Two pages, one figure, one reference. ("Petroleum Processing," July 1957, page 116.)

# The system: acetic acid — carbon tetrachloride — water

From Australia comes a discussion of apparatus for determining liquid-liquid equilibrium for the system: acetic acid—carbon tetrachloride—water at 25°C. Seventeen pages, seven tables, seven figures, 23 references. ("Chemical Engineering Science," June 1957, page 245.)

## Preventing acid condensation

This paper deals with an economical method for preventing condensation of acid in oil-fired boilers. Ammonia is injected into the combustion gases to reduce corrosion of exposed steel surfaces. Eight pages, two tables, nine figures, 19 references. ("Combustion," July 1957, page 33.)

#### **Process control**

This is a discussion of the 'how', 'why,' and 'wherefor' of chemical process control. Steps for achieving satisfactory control are presented, along with examples. Six pages, one table, three figures, 35 references. ("Industrial Quality Control," May 1957, page 46.)

#### Metering nozzles

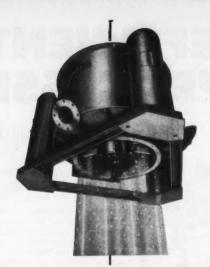
From England comes this study of one-dimensional flow in closed converging channels. A general equation for pressure-drops and flow rates is given. Minor losses vary with throttle ratios for metering nozzles. Three pages, eight figures. ("The Engineer," July 1957, page 4.)

#### Caustic soda

From England come precautions to be observed while handling, transporting, and storing caustic soda. Treatment of burns and injuries to eyes from this alkali is also covered. Six pages, seven figures, one photograph. ("Chemical and Process Engineering," May 1957, page 175.)

#### Plastic laminates

Fatigue properties of fibrous glass-reinforced plastic laminates subjected to various conditions were studied. Temperatures up to 500°F were covered. 12-pages, six tables, 14 figures, four references. ("Modern Plastics," June 1957, page 163.)



# Tolhurst dentrifugal cuts 48 processing hours down to 8



In a leading chemical plant, one Tolhurst Batch-Master centrifugal is now processing the same volume of fine organics in 8 hours as two other centrifugals formerly did in 24 hours. The reason: Tolhurst's hydraulic unloader and bottom discharge unload the solids in just 30 seconds. The other batch centrifugals with manual unloading took 15 minutes or more. And Tolhurst labor savings on the job amounted to 16 manhours a day.

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Specialists in liquid-solids separation
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Check 1596 opposite last page.

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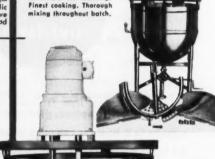
with GROEN mixer units

produces emulsifying, ng action, assuring perfect mix with small batch.



Model DADN (Special)— Power operated hydraulic stilt kettle Bottom drive Bottom driv Easy to loc double motion agitator.

Model DA — Conventional heavy-duty double motion agitator. Best for heavy



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There's deep-rooted efficiency in these agitator kettles because 50 years of know-how is factory-built into them. Cooking . . . cooling . . . mixing . . . they'll

measure up to your most exacting requirements. In mixing, they swirl, beat, blend . . . gently or

vigorously, as you will . . . with utter thorough-

ness. And in the function of cooking or cooling,

nothing surpasses the GROEN steam jacket for

fast, thru-and-thru heat or cold transfer. Stainless

steel throughout. Simple to operate, easy to clean.

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costs, improving production, for many of the big

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all agitator parts quickly

removable for cleaning

Especially designed for medium to heavy mixing. Instantly demountable shaft coupling . . .

MODEL TA For extra heavy mixing. Has twin-shaft operating two sets of agitators for extra thoroughagilators for extra thoroi ness. Especially excellent on heavy, viscous ma-terials. Uses a wide variety of blenders, of blenders, beaters, mix-ers. All parts instantly re-

easy cleaning.

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Century

Check 1597 opposite last page.



### new literature

Industrial bulletins pertinent to the reader . . . offering data on products, processes, services. Additional reviews of catalogs, bulletins, data sheets, etc., are found throughout other sections of this magazine

#### Eliminates mixing tanks

Manufacturer's bulletin describes and illustrates pipeline mixer for one- to eightinch pipe. Bul 531-New England Tank & Tower Co., Tileston St., Everett 93, Mass.

Check 1577 opposite last page.

#### industrial filter paper

Clear, concise review of filtration practice plus an explanation of how paper, as filtering media, helps solve problems in laboratory and industrial use, are covered in 24-page catalog. Cat 357 The Eaton-Dikeman Company. Dept. CP, Mt. Holly Springs, Pa. Check 1598.

#### Describes fiber drums

Folder of four pages points out features, shows construction, and lists specifications of fiber drums. Fiber drum folder — Fiber Drum Div., National Steel Container Corp., Dept. CP, 6700 S. LeClaire Ave., Chicago 38, Ill. Check

#### Adhesion, impact testers

Bulletin of two pages covers tester designed to measure amount of bond or adhesion between plies of a multi-ply paper; also describes an instrument used to predict performance of packaging materials subject to repeated impacts. Adhesion, Impact Tester Bul-Thwing-Albert Instrument Co., Dept. CP, Penn St. at Pulaski Ave., Philadelphia 44, Pa. Check 1600.

#### Urea, melamine handbook

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Illustrated handbook of 74 pages is general guide to proper storage, preforming preheating, molding, finishing and testing of urea and melamine molding material. It contains 15 pages of general reference material, including tables, charts, and definitions. "Plaskon Molding Handbook" -Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Check 1601 opposite last page.

#### Turbine flow meter

Device for the precise measurement of liquid flow is described in eight-page catalog. Cat 10C150 — Fischer & Porter Co., Dept. CP, 75 Jacksonville Rd., Hatboro, Pa Check 1602.

#### Radioisotope information

Complete line of radioactive isotopes for industrial and other uses is described in data sheet. Prices are listed. Microcurie amounts can be purchased without license from AEC. Bul 14A - Nucleonic Corporation of America, Dept CP, 196 Degraw Street, Brook-lyn 31, N.Y. Check 1603.

#### Detachable bulk container

Bulletin of four pages lists specifications and shows applications of detachable container for handling bulk loads. Folder A-304-F-2-Dempster Brothers, Inc., Dept. CP. Knoxville 17, Tenn. Check

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CESSING

#### Metallic bellows

Design, physical properties, and advantages of metallic bellows are presented in eightpage bulletin. Cat 2 — The Belfab Corp., Dept. CP, 11 Ramah Circle, Agawam, Mass. Check 1605.

#### **Motor starters**

Manufacturer's line of synchronous-motor starters for all low voltages and for 2200 to 4800-volt power systems are detailed in two bulletins. Buls 8200 and 8820—Electric Controller & Mfg. Co., Div. of The Square D Co., Cleveland 28, Ohio.

Check 1351 opposite last page.

#### flexible plastic pipe

Bulletin of 10 pages on flexible polyethylene pipe covers advantages, applications, fittings, and installation. Cat 401 — Orangeburg Manufacturing Co., Inc., Dept. CP, Orangeburg, N.Y. Check 1606.

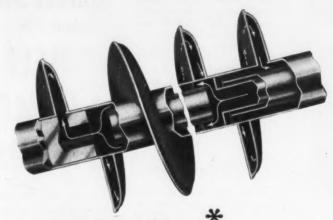
## WANT MORE

. . . about things you read about in the New Literature Section?

#### Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We will contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you. New savings in heat-exchange processes . . .



# THE holo-flite PROCESSOR

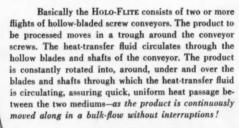
A simpler, more compact way to cool, heat or dry—in continuous flow!

Do you have processes where slurries, solids, pulps or pastes must be cooled, heated or dried? Do you know you can now handle such processes—in continuous flow—in as little as 1/5th the space required by other types of heat exchangers—and with many other important advantages?

The revolutionary HOLO-FLITE Processor is the answer!

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COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
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DUALAIRE Reverse-Jet Filters
HOLO-FLITE Processors



Our engineers will gladly study your particular operations and make recommendations.

Write, wire or phone our nearest office!

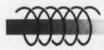
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# why IT'S BETTER!

The Holo-FLITE principle provides many important advantages in modern processing operations...



ITS LARGE HEAT-TRANSFER SURFACE requires far less space—as little as 1/5th the space required by other heat-exchange equipment. Further, flights can be "stacked" as high as desired to save floor space, simplify installation!



ITS SLOW ROTATION IS SO GENTLE that granular and powdered solids are handled with no dusting—little or no particle abrasion. Result—no dust recovery problems . . . simple, inexpensive installation.



IT IS ADAPTABLE to a wide range of applications—handles solids, pulps, pastes and slurries with equal ease. Heat transfer agent can be refrigerant, water or other fluids to provide a wide range of temperatures. Cooled products can be packed directly from HOLO-FLITE discharge, saving time, space and additional handling.







IT CAN BE DESIGNED to handle virtually any capacity by varying the diameter and length of the flights, and the number of "tiers."



#### FREE 8 PAGE bulletin describes Holo-Flite features and applications. Send for your

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Engineers and Constructors of Equipment for Collection of Suspended Material from Gases . . . and Equipment for the Process Industries

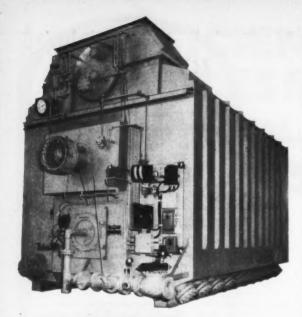
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Check 1607 opposite last page.

OCTOBER 1957



# **Union Packaged Vaporizers** produce a wide range of temperatures at low pressure

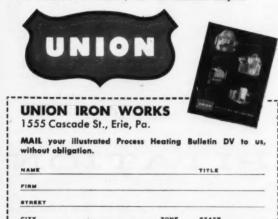
Furnished as a packaged unit completely assembled, piped and wired with controls mounted, this Union Type MH Dowtherm Vaporizer plays an important role in producing phthalic anhydride for a major coke and chemical concern. Equipped for gas firing, it has a capacity of 11,000,000 BTU/hr at

Its compact, divided tube bank design assures uniform gas flow across the heating surface. With greater heating surface per BTU provided, correct fluid temperatures are maintained at all times

Outfitted for heating with oil, gas, waste heat or special fuels, Union Vaporizers (both packaged and field erected) can be installed indoors or out to provide a wide range of accurately controlled temperatures at low pressure.

Union also produces a complete line of Process Heating Equipment for use with Dowtherm "A" and "E", Para-Cymene, Anisole, Aroclor #1248 and Heat Transfer Oil, either convection or forced circulation.

For detailed information, mail the attached coupon.



Check 1608 opposite last page.

#### **NEW LITERATURE**

#### High-vacuum equipment

Data on evaporators, furnaces, curing ovens, and degassing equipment for ferrous and non-ferrous castings, as well as other high-vacuum equipment, are presented. Highvacuum Equipment Bul Mfg. Div., The New York Air Brake Co., Washington St., Boston 30, Mass.

Check 1523 opposite last page.

#### V-drive catalog, manual

Catalog of 46 pages provides convenient source of information on fractional-hp V-drives, drive parts, and accessories. Form F-10 — Maurey Mfg. Form F-10 — Maurey Mfg. Corp., Dept. CP, 2915 S. Wabash Ave., Chicago 16, Ill. Check 1609.

#### **Bulk material handling**

Latest information on manufacturer's equipment for storing and handling bulk materials is contained in a 12-page bulletin. Descriptions, specifications, and dimensions of vertical and horizontal tanks, as well as pneumatic conveying systems are covered. Bul 574—The Day Sales Co., Dept. CP, 810 3rd Ave. N.E., Minneapolis 13, Minn. Check

#### Fume hood data

Engineering data and recommendations, operating charac-teristics, and operating cost comparisons for manufacturer's fume hoods are contained in 48-page catalog. Fume Hood Cat — Kewaunee Mfg. Co., Dept. CP, Adrian, Mich. Check

#### Steel strappers

Series of photographs in eight-page pocket-size folder show construction, features, and operation of round steel strapping machine. Strapping machine folder — Gerard Steel Strapping Div., U.S. Steel Corp., Dept. CP, 2915 W. 47th Chicago 32, Ill. Check



Check 1613 opposite last page.

COMPANY

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### WHY PUMCUPS MAKE A DIFFERENCE

- in reciprocating pumps
- in air and hydraulic cylinders

With Darcova Pumcups in your cylinders, there's less fluid slippage.

With Darcova Pumcups in your cylinders, there's less haid suppage-high volumetric efficiency is maintained and Pumcups outlast other packings at least 3 to 1! There's less down-time! Lower power cost! Smoother operation! Less maintenance and replacement! Longer life is the result of truly advanced cup engineering, in-cluding 100% nylon composition, plus a choice of types, textures and precision sizes to exactly match fluid, cylinder, pressure and temperature conditions.

These same factors contribute to prolonged high efficiency by permitting full advantage of the "cup principle". Thus fluid pressure always keeps Pumcups snug against cylinder wall, despite eventual wear, while the total frictional load is minimized.

Send for Bulletin 5503. It will give you all the facts. DARLING VALVE & MANUFACTURING CO. TRADE MARK

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CHEMICAL PROCESSING

# Type HD



SQUARE D LINE PANY



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TURING CO.



#### Paper, pulp future

Two government bulletins give statistics and future demand projections to 1965 for the pulp, paper, and board industry. "Technical Guide" is a notebook-size, 40-page booklet consisting mostly of tables and charts, and costs 40c a copy. "House Report 573" is digest-sized, 220-page full report of a committee. Besides detailed tables and charts, it contains voluminous text and testimony, and costs 55c. Order from Office of Publications, US Dept. of Commerce, Washington 25, D.C.

#### Pressure gages

Bulletin of four pages contains manufacturer's line of vacuum gages, vacuum pump gages, absolute pressure gages, and mercurial barometers. Bul D-2 - Precision Thermometer & Instrument Co., Dept. CP, 1434 Brandywine St., Philadelphia 30, Pa. Check 1615.

#### Filters for nuclear use

Folder of six pages covers complete line of filters and filtration systems for use in nuclear power and research applications. Cat 54-102 — Cuno Engineering Corp., Dept. CP, S. Vine St., Meriden, Conn.

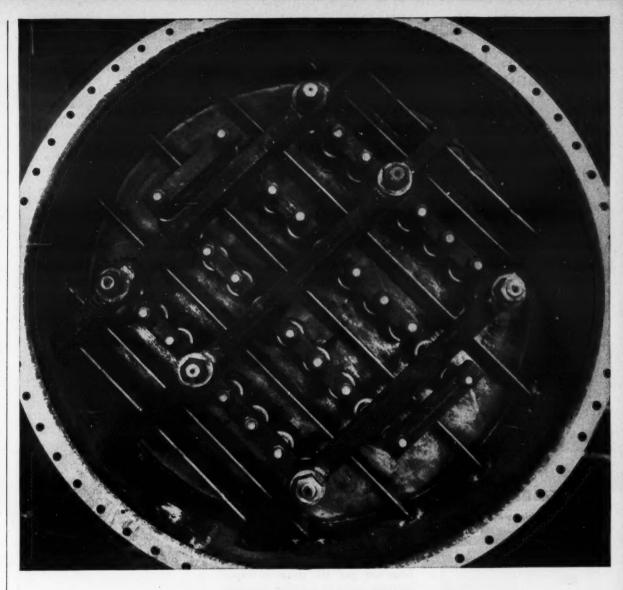
#### Separation methods

How research and development have made high voltage and magnetic separation methods important tools in ore dressing field is discussed in four-page technical paper.
"High Voltage and Magnetic Separation" - Carpco Mfg., Inc., Dept. CP, Jacksonville 6, Fla. Check 1616.

#### Figures mixer requirements

Manufacturer offers confidential data sheet for figuring your mixer requirements. Bul 107-Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, N. Y.

Check 1473 opposite last page.



## THERE'S MORE TO AN EGG THAN THE SHELL ...

What's inside the shell really counts most. Take this section of a Type 347 stainless steel tower. The complex interior design required exacting craftsmanship—no more so, however, than is customarily applied to every Graver project. Graver's alloy fabricating skills and experience cover a wide range of work from the simplest vessels to mammoth field erected towers and tanks. Whether your project calls for stainless steel, stainless-clad, nickel-clad or other miracle metals, Graver craftsmanship assures rigid conformity to specifications.

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Check 1617 opposite last page.

## **Spring-Loaded Thermocouples Assure Dependable Contact**

Field-Proven By Many Years' Successful Use



You always get fast, dependable response from T-E's miniature bayonet thermocouples because (1) spring-loaded hot junctions are always held in tight contact with the measured surface—regardless of expansion and contraction, and (2) the 'couples themselves are extremely sensitive to temperature changes. They are widely used with cylinder heads, extruders, heat transfer lines and other similar applications. Adapters of different lengths permit use of one thermocouple to measure temperatures at many different depths. Specially designed, patented, pipe-clamp adapters are also available. Bayonet-lock caps provide quick, easy removal. Lead connections are supplied straight or with 45° or 90° angles. All probes and adapters are of Stainless Steel. Available in C-C, I-C and C-A.

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SADDLE BROOK, NEW JERSEY
ada - THERMO ELECTRIC (Canada) Ltd., Brampton, Ont.

Check 1618 opposite last page.

## Learn to Cope with Carryover-**Entrainment-Mist Extraction Problems**

This FREE Booklet will show you how



Anderson's free Purifier selector booklet will show you how to separate carryover, entrainment and mist from any gas, air, steam or vapor carrying vessel or pipeline. Contains helpful tables and information on internal Hi-eF Purifiers for inside vessel installation, line types installed in process piping and receiver types for heavy liquid loads. Send for your copy today. Special units designed for nearly every requirement.

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Please send me a fre Bulletin 801.	ee copy of your Purifier
Name	Title

Watchdogs of Pipeline Equipment and Processes



Check 1619 opposite last page.

#### **NEW LITERATURE**

#### Fork truck service school

Manufacturer's eight-page brochure describes field service school for fork trucks. Facilities, methods of teaching, and course of study for maintenance and repair of gas, electric and LP-Gas powered fork trucks, powered hand trucks, and straddle carriers are covered. Field service school brochure-Industrial Truck Division, Clark Equipment Company, Dept. CP, Battle Creek, Mich. Check

#### Hydraulic power units

Pumps, cylinders, pressure switches, and accessories are included in 52-page catalog on hydraulic-power units. Hydraulic Power Unit Cat — Oil-Dyne, Inc., Dept. CP, 2115 W. Marquette Rd., Chicago 36, Ill. Check 1621.

#### **PVC** pipe support chart

Chart giving recommended support spacing for PVC pipe of different schedules and sizes is featured in manufacturer's booklet. Other valuable application data are included. Bul TTP 119R-Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11, Ky.

Check 1392 opposite last page.

#### **Chemical reactors**

Stainless steel reactors ranging in size from five to two thousand gallons are described in 16-page bulletin. Section lists reasons for, and advantages of, heat treating. Bul 944

— The Pfaudler Co., Dept. CP,
1041 West Ave., Rochester,
N.Y. Check 1622.

#### Solvent chart

Foldout chart, 9x24", suitable for filing, lists properties and characteristics of 41 solvents (aromatic, intermediate, and aliphatic). Solv-A-File— Eastern States Chemical Corp., PO Box 5008, Houston 12, Tex. Check 1623 opposite last page.



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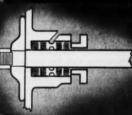
MORE OF
THE GARLOCK 2,000

LATTICE-BRAID Packings of pure Teflon fiber for rotating shafts at high peripheral speeds... tough, chemically inert, yet resilient for positive sealing and cooler operation under extreme temperature and chemical exposure.

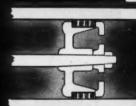




Wherever corrosion, contamination or torque is a problem on reciprocating applications or slow-turning valves CHEVRON! Packing made of Teflon is recommended.



Centrifugal pumps handling hot sulfuric acid and petroleum fractions leaked badly with ordinary packing. Also, new shaft sleeve required every few days. Tefton packing reduced leakage, and after several months service both packing and shaft were still in good condition.



Teflon packing rings on duplex pump handling 50% sodium hydroxide at 270 F, showed no sign of wear after 5 months. Formerly, packing lasted average of 30 days.

GARLOCK TEFLON\*

### Packings Reduce Process Shutdowns

Garlock Lattice-Braid Packings of Teflon reduce maintenance, lower replacement costs, reduce wear on pistons and shafts, and increase productive capacity in countless pump applications where corrosive chemicals and severe operating conditions are encountered. The unique properties of Teflon (chemically inert, heat-resistant, low coefficient of friction, etc.) make it outstanding for use in chemical or petroleum process pump packings.

LATTICE-BRAID Packings of Teflon are another important part of "the Garlock 2,000"... two thousand different styles of packings, gaskets, and seals to meet all your needs. It's the only complete line. That's why you get *unbiased* recommendations from your Garlock representative. Call him, or write for LATTICE-BRAID Catalog AD 131.

#### THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada. For information on other fluorocarbon plastic products contact United States Gasket Company, Plastics Division of Garlock.

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Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

For more information on product at right, specify 1624 see information request blank opposite last page.

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# Ask how to cut costs with conveyors



Live roller and gravity roller system handles 55 gal. drums from storage through filling and weighing operations to shipping.

## No manpower needed to keep heavy drums moving

STANDARD conveyor systems keep heavy, bulky commodities moving with minimum manpower and time loss. Systems can be job-tailored to any specific materials handling prob-

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With more than 50 years of experience in conveyor application, Standard engineers are qualified and ready to help solve your handling

problems. Standard builds permanent or portable systems and units, using roller, belt, slat, chain, pushbar or sectional conveyors — pow-er or gravity; also spiral chutes and pneumatic tube systems. Consult STANDARD CONVEYOR COM-PANY General Offices: North St. Paul 9, Minnesota. Sales and Service in principal cities.





Call the Standard engineer listed in your classified phone book, or write direct for Bulletin 309 - address Dept P-10

Cut costs, too, in shipping and receiving operations with Standard portable units, either powered or gravity operated. (Left) HANDIBELT portable powered conveyor unit (right) LITEWATE Sectional Roller Conveyor.



Sales and Service In Principal Cities.

Check 1625 opposite last page.

#### NEW LITERATURE

#### Cut electroplating costs

Nine ways to improve elec-troplating and cut costs are listed in 12-page booklet. Practical suggestions included are: How to select proper compound, use of titrations, and tips on thorough rinsing. "9 Ways to Cut Electroplating Costs" — The Diversey Cor-poration, Dept. CP, 1820 W. Roscoe Street, Chicago 13, Ill. Check 1626.

#### Shows storage racks

Bulletin of four pages contains 30 photographs and detailed descriptions illustrating mandescriptions illustrating manufacturer's line of racks to handle all types of industrial storage. "M-H Standard Racks" — M-H Standard Corp., Dept. CP, 513-521 Communipaw Ave., Jersey City, N.J. Check 1627.

#### Close-coupled control

Manufacturer's bulletin describes flow control system featuring complete elimination of controller-to-valve response delay, and true closecoupled control even when operating panel is hundreds of feet away. Bul 470 - The Foxboro Co., 819 Neponset Ave., Foxboro, Mass.

Check 1353 opposite last page.

#### Aerosol packaging

Catalog contains information about one-use pressurized can, including types of products packaged, suppliers of valves, loading equipment, and independent loading contractors. "Pressure Packaging" — Can Div., Crown Cork & Seal Co., Inc., Dept. CP, 9300 Ashton Rd., Philadelphia 36, Pa. Check 1628

#### **Electric motor protection**

Booklet of 24 pages discusses use of epoxy resins for protecting all forms of large electrical apparatus. "The Epoxylite Story" — The Epoxylite Corp., Dept. CP, 10829 E. Central Ave., El Monte, Calif. Check 1629.

#### Portable mixers

Description, dimensions, and operating information on manufacturer's portable mixers are presented. Bul 108-Mix. ing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11. New York.

Check 1473 opposite last page.

#### Pectic enzymes data

Bulletin of five pages has data on pectic enzymes used in clarification of wines, vinegar, fruit extracts. Enzyme works by hydrolyzing and solubiliz-ing pectin, and retains delicate elements of taste and aroma 29 references. Bul SP-2 5/57 — Rohm & Haas Co., Dept CP, Washington Sq., Philadel-phia 5, Pa. Check 1630.

#### Rotary dryers for sludge

Bulletin of four pages describes drying system for treatment of industrial waste. System features manufacturer's rotary dryer equipment. Bul 572 — Standard Steel Corp, Dept. CP, 5001 S. Boyle Ave, Los Angeles, Calif. Check 1631.

#### Diaphragm valve story

Manufacturer's idea booklet shows how diaphragm valve feature can save operating dollars. Booklet also contains information on precision metering and proportioning pumps. Positive flow control booklet-Hills-McCanna Co., 2341 W. Nelson St., Chicago 18, Illinois.

Check 1306 opposite last page.

#### High-vacuum pumps

Bulletin of 24 pages describes and illustrates high-vacuum pumps for laboratory and industry. Furnaces, gages pumps, valves, stills, and equipment supplies and accessions. sories are also described. Bul 1-1 - Rochester Div., Consolidated Electro-dynamics Corp., Dept. CP, 1775 Mt. Read Blvd., Rochester, N.Y. Check 1632.

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mixers

Induced-draft counterflow cooling tower is described in 32-page bulletin. Advantages, construction, and operation are covered. Bul CT-57-1 Foster Wheeler Corp., Dept. CP, 165 Broadway, New York 6, N.Y. Check 1633.

Shows valve line

Condensed catalog of 4-pages describes and illustrates manufacturer's line of steam and liquid control valves. Cat. 57-0. C. Keckley Co., Dept. CP, 3402 Cleveland St., Skokie, Ill. Check 1634.

High-vacuum pump data

Applications and specifications are included in information supplied by manufacturer. High-vacuum Pump Bul -Mfg. Div., The New York Air Brake Co., Washington St., Boston 30. Mass.

Check 1523 opposite last page.

WANT MORE INFORMATION . . .

about things you read about in the New Literature Section?

Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

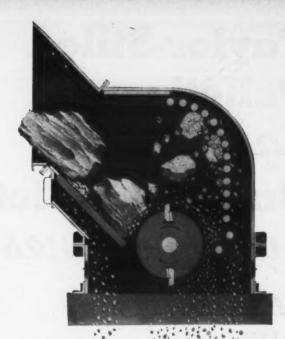
We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

FOR GREATEST

POSSIBLE

REDUCTION

ONE PASS ...



# THE JEFFREY ROCK BUSTER



24-inch carbon electrodes, 6 feet long, have been fed to this Rock Buster for seven years. Plant engineers are "amazed" at its continued fine performance.



Carbide, always a difficult material to handle, is literally exploded by impact in the Jeffrey Rock Buster and made ready for further processing.

Superior in performance and economy, this hard-hitting giant with its high speed impeller bars strikes the material in suspension . . . continues to wallop it until it's broken down to the desired size.

Feed the Rock Buster large, friable, nonabrasive materials and they're quickly reduced to a product of market size. (No wet or sticky materials; that's a job for the Jeffrey Mud Hog.) Size of finished product can be adjusted to meet your various requirements.

Crushing elements are made of manganese steel, enabling them to stand up in the toughest service. For a copy of Bulletin 854 describing the Rock Buster, write The Jeffrey Manufacturing Company, 853 North Fourth Street, Columbus 16, Ohio.



CONVEYING . PROCESSING . MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

Check 1635 opposite last page.

# Taylor-Stiles Pelletizers give you



Uniform Pellets
without fines
or longs

NO FINES

With a Taylor-Stiles Pelletizer there are no fines to agglomerate, "cement" and clog up the feed.

#### NO LONGS

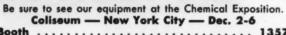
There are practically no longs to cause bridging in an extruder or molding machine when you use a Taylor-Stiles Pelletizer. By eliminating longs there will be an even flow of material and production will not be reduced.

The absence of longs also means even heat in molding — there's no danger of overheating small pellets in order to melt oversized longs.

The shearing action of Taylor-Stiles Pelletizers produces cleanly cut, uniformly sized pellets — by the ton. The absence of longs and fines, made possible through the use of Taylor-Stiles' Shearing Process, assures uniform molding and extruding, a better end product and production uninterrupted by bridging or cementing.

Taylor-Stiles Job Engineered Knives are quickly and easily resharpened, — eliminate expensive down time.





# Taylor, Stiles & Co.

20 BRIDGE ST.

RIEGELSVILLE, N. J.

Check 1636 opposite last page.

#### NEW LITERATURE

#### Side-entering agitator

Bulletin discusses side-entering agitator equipment furnished in four sizes up to 25 hp. Equipment is described and illustrated, and specifications are included. Bul 532—New England Tank & Tower Co., Tileston St., Everett 93, Massachussetts.

Check 1077 opposite last page.

#### Mobile belt conveyor

Features and cost-cutting advantages of manufacturer's lightweight aluminum, belt conveyor are detailed in fourpage bulletin. Drawings and charts show proper operational adjustments. Bul 50AA—E. W. Buschman Company, Dept. CP, Clifton and Spring Grove Aves., Cincinnati 32, Ohio. Check 1637.

#### Controlling, recording

Bulletin tells complete story on manufacturer's recorders and recording controllers for precision processes. Bul F-7955 — Barber-Colman Co., Dept. V, 1520 Rock St., Rockford, Illinois.

Check 1319 opposite last page.

#### Mixer seals

Information on quick-change rotary mechanical seals for pressure and vacuum mixing can be found here. Bul 111—Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, New York.

Check 1473 opposite last page.

#### Photoelectric control

Catalog supplement of eight pages describes and illustrates manufacturer's combined photoelectric and timing controls for applications such as conveyor jam-up control in combination with counter actuation. Supplement to Cat. 57—Autotron, Inc., Dept. CP, Box 722-S, Danville, Ill. Check 1638.

# GET MORE OUT OF YOUR SPRAYING EQUIPMENT WITH LESS POWER

For spraying, washing, rinsing and cooling, Yarway Spray Nozzles will improve the efficiency of your spray equipment.

There are no internal vanes or other restrictions to clog or hinder the flow.



Cast bronze Involute-type
(Bar stock also available)



Bar stock Fan-spray-type

Yarway Spray Nozzles are available in two types—the Yarway Involute producing fine hollow cone spray with minimum energy loss, and the Yarway Fan-spray for flat fan-shaped spray with time-saving slicing action for cleaning.

Ask for a free copy—Bulletin N-618.

#### YARNALL-WARING COMPANY 125 Mermaid Avenue

125 Mermaid Avenu Philadelphia 18, Pa.



spray nozzle

Check 1639 opposite last page.

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#### pvc check valve

Unplasticized PVC check valve for installation in either vertical or horizontal position is described. Bul TTP 150-Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11. Kentucky.

Check 1392 opposite last page.

#### Upgrades lubricants

Report of 14 pages describes detergent-inhibitor designed for both low-temp stop-andgo automotive service and high-temp diesel service. Typical analyses and field evaluations are included. Tech Report ELD-7197—Enjay Co., Inc., 15 W. 51st St., New York 19, N.Y.

Check 1640 opposite last page.

#### Improved feeder design

Booklet tells about manufacturer's line of feeders for bulk materials which incorporate many features requested by feeder users. Specifications are included. Feeder booklet - Eriez Mfg. Co., 73-V, Magnet Dr., Erie, Pa.

Check 1469 opposite last page.

#### **Pneumatic conveyors**

Construction, features, and operation of various types of pneumatic conveying systems for dry, free-flowing materials are described in eight-page bulletin. Bul PB-500 — Air Appliance Div., U.S. Hoffman Machinery Corp., Dept. CP, 103 Fourth Ave., New York 3, N. Y. Check 1641.

#### Shaft seal problems?

Bulletin contains details on shaft seals for all liquid handling requirements from hot or cold water to destructive acids and corrosives. Bul S-204-3 - Crane Packing Co., 6421 Oakton St., Morton Grove, Ill.

Check 1307 opposite last page.

...more quality proved POWELL VALVES



Fig. 2337—Stainless Steel Gate Valve for 200 Pounds W.P. Screwed-in Bonnet. Inside Screw, Non-rising Stem.

> Fig. 1847-Small Stainless Steel Swing Check Valve for 200 Pounds W.P.



Fig. 2491-Stainless Steel O.S.& Y. Gate Valve for 150 Pounds W.P.

Fig. 2107-Stainless Steel "Y" Valve for 150 Pounds W.P. Outside Screw Rising Stem and Yoke.



# for quality-crafted flow control

Ask your Powell Valve Distributor for the facts about quality-proved bronze, iron, steel and corrosion-resistant valves. Whatever your flow control problem, there's a Powell Valve to solve it.

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

Check 1642 opposite last page.

OCTOBER 1957

ONLY SICON 'takes" the 550°F. temperature reached in sections of this Preway heater grille

ONLY SICON protects this "Direction Flo-Grille" where temperatures often reach above 500° F.







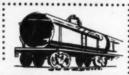


The upper grille of the famous PREWAY heater often reaches a surface temperature of 550°F. Here, the use of an organic finish was found to require raising grille to protect lower part. But in tests SICON protected so well that re-design proved unnecessary. Sicon in amart decorative colors can protect your product too-and save money besides! Write for proof.



Check 1643 opposite last page.

## **Unusual phenolic coatings** protect tanks and drums





Series B-124 Unichrome Phenolic Coatings offer reliable and durable lining for tank cars, storage tanks, and processing equipment.

Some coatings in this series deposit films twice as thick as ordinary phenolic coatings. One has a built-in "cure control." By color, it indicates the completeness of curing.

For rough and tumble service in drums, a Unichrome phenolic lining gives reverse impact resistance superior to ordinary phenolics.

Many companies who can give you fast service specialize in applying Unichrome Tank and Drum Linings. For name of one nearest you, contact Metal & Thermit. Also, send for Bulletin Chem-C-2.

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Check 1644 opposite last page.

#### **NEW LITERATURE**

#### Mix up to six million gal

Details, specifications, description, and dimensions on sideentering mixer for use in tanks as large as six million gal, on fluids of all viscosities up to about 4000 centipoises, are covered. Bul 104-Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, New York.

Check 1473 opposite last page.

#### Imprint attachment

Manufacturer's coating and imprinting attachment for wrapping and bundling ma-chines is discussed in fourpage bulletin. Photographs and schematic drawings show many applications of attach-ment. Bul RIN-6 — Adolph Gottscho, Inc., Dept. CP, Hill-side 5, N.J. Check 1645.

#### **Crawler tractor specs**

Fold-out specification sheet of six pages covers Dieselpowered crawler tractor. Cutaway view shows both gear-type and hydraulic torque converter drive transmissions, and many mechanical, design, and construction features. MS-1192 - Construction Machinery Div., Allis-Chalmers Mfg. Co., Dept. CP, Milwau-kee, Wis. Check 1646.

#### Gum arabic uses

Reports tell gum arabic's uses as emulsifying agent, coating material, and ingredient in pharmaceuticals and flavors. Making clear solutions is discussed. Reports A-820-G2 and -G3 — Morningstar, Nicol, Inc., Dept. CP, 630 W. 51st St., New York 19, N.Y. Check 1647.

#### Tank-top agitator

Features, specifications, and applications of manufacturer's tank-top agitator are covered. Bul 551-New England Tank & Tower Co., Tileston St., Everett 93, Mass.

Check 1077 opposite last page.



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**OUTPERFORMS ALL OVENS** 

GUARANTEED

• 23.8% COST SAVINGS
• AUTOMATIC HEAT RECOVERY
• MULTIPLE FAIL-SAFE FEATURE

#### IMPROVED PRODUCTS SUPERB PERFORMANCE

POWER-O-MATIC automatically proportions minimum wattage in relation to temperature and work load. Fully automatic. Operator merely sets temperature. Finest advancement of temperature control in 50 years.

COMPETITIVELY PRICED!



Models from



TEMP. RANGE 100°F. TO 600° F. Write for "The POWER-O-MATIC Story"

BLUE M ELECTRIC CO. BLUE ISLAND, ILL.

CTURERS AND DESIGNERS OF COMPLETE

Check 1649 opposite last page.

CHEMICAL PROCESSING



- ULTIMATE IN SIMPLICITY AND COMPACTNESS—a straight line extension of a standard induction motor—or available without motor.
- UNLIMITED SPEED RANGE from any desired maximum speed to zero, including reverse, without stopping motor.
   UNMATCHED ACCURACY—of speed setting and re-setting.
- NO PERISHABLE PARTS—such as belts or tubes, requiring periodic replacement.
- PROVED PERFORMANCE—twenty years satisfactory use as standard equipment.
- LOW COST—a better job for less money.

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GRAHAM TRANSMISSIONS, INC.

Check 1650 opposite last page.



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#### **NEW LITERATURE**

#### **Tube manufacturing**

Facilities, equipment, and products of tube manufacturer are described and illustrated in 12-page brochure. "Wolverine Serves The Refrigeration Industry"—Wolverine Tube, Div. of Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich.

Check 1652 opposite last page.

#### Conveyor ideas

Bulletin of two pages describes application ideas and features of manufacturer's gravity conveyor. Specifications for versatile conveyor strip are included. Bul FT-57—The Rapids-Standard Co., Inc., Dept. CP, 342 Rapistan Bldg., Grand Rapids, Michigan. Check 1653.

#### Aerosol filler described

Installation and operation of filling unit for aerosol are described and illustrated in four-page pocket-size folder. Chart of weight variations demonstrates accuracy of filler. Form 161 — Mojonnier Associates Inc., Dept. CP, 9151 Fullerton Ave., Franklin Park, Ill. Check 1654.

#### German equipment guide

English-language directory of 800 pages lists 20,000 German manufacturers of all types of machinery, precision instruments, and industrial equipment, classified in 9000 product categories. To obtain 1957 directory of German equipment and machinery manufacturers remit \$3.50 direct to Nordeman Publishing Company, Inc., Dept. CP, 14 E. 62nd St., New York 21, N.Y. Check 1655.

#### Chain blocks

Manufacturer's wall type, 17 x 21½" safety chart effectively illustrates safe handling with chain blocks. Chain Block Safety Chart—Manning, Maxwell & Moore, Inc., Muskegon, Michigan.

Check 1656 opposite last page.

# "FLIP-TOP"Action!



A flip of the handle is all it takes to open or close a Hoke toggle valve, providing fast, positive control on gas or liquid lines at pressures up to 1000 psi. Seats and stem seals are tight enough for most vacuum work. For instrument panels or test stands, in angle and globe patterns of brass or stainless. Sizes \%" through \%", handles are colored for quick identity. Complete data is yours for the asking.

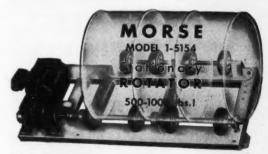


#### HOKE INCORPORATED

Fluid Control Specialists
145 S. DEAN STREET, ENGLEWOOD, N. J.

Check 1657 opposite last page.

#### **HEAVY DRUM ROTATING**



#### Cuts Costs . . . Fast . . . Safe

You can now mix, blend or tumble loads up to 1000 lbs. with the new MORSE Model 1-5154 Stationary ROTATOR. It is primarily engineered for heavy loads in 30 to 55 gallon drums yet lesser loads can be rotated with equal efficiency. Any diameter drum can be mounted by adjusting only three bolts.

The rugged ½ H.P. motor can be geared to give any fixed speed from 5 to 30 RPM. Six inch drive wheels (4)

The rugged ½ H.P. motor can be geared to give any fixed speed from 5 to 30 RPM. Six inch drive wheels (4) and idler wheels (4) have Neoprene treads for smooth, non-slip revolving. Drive shaft, idler shaft and all welded steel frame are extra rugged construction for long-lasting, trouble free operation.

A double drum model No. 2-5154 with a 2000 lb. capacity is also available. Write today for brochure on complete Morse line.

MORSE MANUFACTURING CO, INC.

Check 1658 opposite last page.

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GIVE YOU THE LOW COST PERFORMANCE MADE POSSIBLE BY THE

AJAX RECIPROCATING DRIVE Ajax Lo-Veyor performance is built around its exclusive

reciprocating drive. It is a self-contained unit housing two gear driven weights rotating in opposite directions, which impart reciprocating action in automatic balance. The drive mechanism runs on anti-friction bearings in an oil tight housing — which keeps lubrication in and abrasive dirt out. Lo-Veyors are available in open and closed pan or tubular types. Write for catalog.



Showing Ajax Reciprocating Drive Unit. Smooth operation permits installation without heavy anchor-age to building.

#### AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.

Check 1659 opposite last page.



Check 1660 opposite last page.

#### **NEW LITERATURE**

#### Mixer types shown

Turbine, paddle, and propeller types of top- and bottom-entering mixers for open and closed tanks are described and illustrated in manufacturer's bulletin. Construction is shown, and specifications are given. Bul 102—Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, New York.

Check 1473 opposite last page.

#### Lithium hydride data

General properties, physical properties, analyses, and uses of lithium hydride are presented in four-page Bul 102—Foote Mineral Co., Dept. CP, 18 W. Chelten Ave., Philadel-phia 44, Pa. Check 1661.

#### **Nursing new products**

Company's 26-page brochure outlines pattern for developing successful new products. Practical suggestions on reducing research expense, increasing sales, cutting costs. and increasing profits are discussed. "How to Develop Successful New Products" Foster D. Snell, Inc., Dept. CP, 29 W. 15th St., New York 11, N.Y. Check 1662.

#### Gas fork-truck data

Gasoline or LPG-powered fork-lift trucks with capacities of 5000 and 6000 pounds are described in two four-page illustrated bulletins. Features, dimensions and performance data, and detailed descriptions of principal components are contained. Buls 1348-A and - The Baker-Raulang Co., Subsidiary of Otis Elevator Co., Cleveland 2, Ohio.

Check 1663 opposite last page.

#### Gas chromatography

Plastic-bound 70-page bibliography includes abstracts and applications on gas chromatography. TP 32—Consolidated Electrodynamics Corp., Dept. CP, 300 N. Sierra Madre Villa, Pasadena, Calif. Check 1664.

#### Fatty acid specifications

Four-page file folder chart specifications of 20 of man facturer's fatty acids and gly erides. Spec folder - Chem. ical Div., Darling & Co., 42 S. Ashland Ave., Chicago Illinois.

Check 1665 opposite last page

#### Nuclear equipment catalog

Manufacturer announce availability of five new page and latest price list revision for insertion in company can-log previously issued. Cat h sertions, price list - Technical Associates, Dept. CP, 14 W. Providencia Ave., bank, Calif. Check 1666.

#### Paper products, govt. specs.

Compilation of paper products that meet various gov ernment specifications has been made available by manufacturer. Kraft paper based materials are primarily used as protective wrappings and packaging. Paper product 1957 list—Cincinnati Indus-1957 list—Cincinnati Industries, Inc., Dept. CP, Cincinnati 15. Ohio. Check 1667.

#### Balance weight guide

Illustrated six-page guide includes new NBS laboratory weight classifications, with tolerance for each, plus a s lection of balance weights by class. Lab Guide to Balance Weights—Will Corporation Lab Supply & Service Center, Dept. CP, Willco Drive, Rochester 3, N. Y. Check 1668.

#### Refinery process pumps

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Bulletin of 12 pages contains information on manufacturer's refinery process pumps with packing gland construction, or with mechanical shaft seal Performance curves for a sizes are shown. Bul B-1605-Peerless Pump Div., Food Machinery and Chemical Corp. 301 W. Ave. 26, Los Angele 31, Calif.

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#### **NEW LITERATURE**

#### Pressure gages

Manufacturer's 32-page catalog on pressure gages contains operational description, adjustments, applications, dimensional drawings, and spec-ifications. Cat. G-52—Helicoid Gage Div., American Chain & Cable Co., Inc., Dept. CP, 929 Connecticut Ave., Bridgeport 2, Conn. Check 1672.

#### Log count rate meter

Radiation counter which eliminates necessity of manual or electromechanical switching is described in two-page illustrated bulletin. Suggested uses are outlined and specifications given. Form 3002-7—The Victoreen Instrument Co., Dept. CP, 5806 Hough Ave., Cleveland 3, Ohio. Check 1673.

#### Pneumatic sifter

Illustrated, two-page specification sheet describes operation of manufacturer's combination dump bin, sifter, and pneumatic conveyor for handling dry materials. Construction and design features are described. Spec Sheet B-106-RA - The J. H. Day Co., Div. of Cleveland Automatic Machine Co., Cincinnati 12, Ohio. Check 1674 opposite last page.

#### Discusses silicones

Booklet of 52 pages discusses chemistry, properties, and applications of silicones. To obtain "The Industrial Chemistry, Properties, and Applications of Silicones," remit \$1.50 direct to ASTM, Dept. CP, 1916 Race St., Philadelphia 3, Pa.

#### Portable, tripod mixers

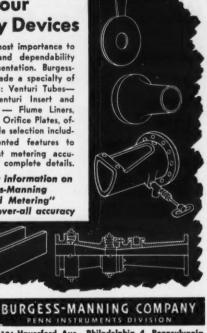
Specifications and features of manufacturer's portable and tripod mixers are presented, and applications are shown. Portable and Tripod Mixer Spec Sheets—New England Tank & Tower Co., Tileston St., Everett 93, Mass.

Check 1077 opposite last page.

### **Don't Minimize** vour **Primary Devices**

They are of utmost importance to the accuracy and dependability of your instrumentation. Burgess-Manning has made a specialty of such devices as: Venturi Tubes-Open Flow, Venturi Insert and ASME Nozzles - Flume Liners, Weir Plates and Orifice Plates, offering you a wide selection including many patented features to provide greatest metering accuracy. Write for complete details.

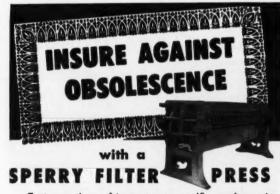
Also ask for information on **Burgess-Manning** "Matched Metering" for highest over-all accuracy



PENN INSTRUMENTS DIVISION 4126 Haverford Ave., Philadelphia 4, Pennsylvania

Instrumentation and Controls for water, steam, gases, sewage and industrial wastes

Check 1675 opposite last page.



Custom engineered to meet your specific requirements. Exact capacity . . . uniform product purity and stability.

Ruggedly built to provide many years of troublefree service. Minimum wear. Low maintenance.

Adaptable for conversion to any type of filtration
operation should changes in your product or process ever become necessary.

Sperry Filter Presses are available in a wide variety of materials and capacities. Write today for the complete

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Check 1676 opposite last page.



Not only does Lenape supply you with superior, SEAMLESS necks ready for attachment, but they cost less than built-up, pipe and flange connections in most sizes.

Get the facts from Lenape. Write today for your copy of a factual cost analysis.

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HYDRAULIC PRESSING
AND FORGING CO.

LENAPE HYDRAULIC PRESSING & FORGING CO.
DEPT. 100
WEST CHESTER, PA.

BID MAN PRODUCTS

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# Specify NAYLOR PIPE and PIPE FITTINGS



WATER LINES
AIR LINES
GAS LINES
COMPRESSED
AIR LINES
VENTILATING
LINES
PROCESS LINES
PNEUMATIC
CONVEYORS
SLUDGE LINES
VACUUM LINES
DRAINAGE LINES

Here is a lightweight pipe with extra strength and safety to handle jobs normally requiring heavier-wall pipe. Its exclusive spiral-lock construction acts as a continuous expansion joint—absorbs shock loads, stresses and strains. Sizes range from 4' to 30' in diameter. All types of fittings, fabrications and connections including one-piece Naylor Wedgelock couplings to speed installation and cut costs. Available in steel, alloys and stainless steel.

Write for Bulletins No. 507 and No. 525

Naylor Pipe Company
1260 East 92nd Street
Chicago 19, Illinois

Eastern U. S.
and Foreign Sales Office
60 East 42nd St.,
New York 17, N. Y.

Check 1678 opposite last page.

#### NEW LITERATURE

#### Industrial movies: how to do them

Eighty-page, digest-size manual tells how to make economical industrial motion pictures. Planning, writing, shooting, editing, sound, motion analysis, and time-lapse are detailed. "Industrial Motion Pictures" is available for 50c direct from Eastman Kodak Co., Dept. CP, Rochester 4, N.Y. Check 1679.

#### **Describes liquid meter**

Manufacturer's stainless steel liquid meter for measurement of corrosive liquids is illustrated and discussed in 4-page bulletin. Bul 94/10—Neptune Meter Co., Dept. CP, 19 W. 50th St., New York 20, N. Y. Check 1680.

#### All-steel hand trucks

Manufacturer's line of allsteel hand trucks are described and illustrated in 12page catalog. Complete specifications on trucks and accessories are included. Cat 57— Dico Co., 202 S.W. 16th Des Moines, Iowa. Check 1681.

#### Mixing equipment

Condensed bulletin presents summary of all types of manufacturer's mixing equipment including top- and bottom-entering, portable, side-entering, and laboratory and smallbatch. Bul 109—Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, New York.

Check 1473 opposite last page.

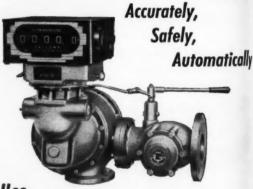
#### Pellet mill details

Bulletin of four pages contains details of construction, applications, and examples of products that can be processed in manufacturer's pellet mill. Detailed dimensional drawings are included. Bul 182 — Sprout, Waldron & Co., Inc., Dept. CP, Muncy, Pa. Check 1682.



Check 1683 opposite last page.

#### HOW TO BATCH OR BLEND LIQUIDS



Use

## **ROCKWELL LIQUID METERS**

with Automatic Quantity Control Valves

This simple Rockwell system brings automation to the liquid process industry. To operate, you pre-set the quantity on the meter register—then open the valve. When quantity is measured, the valve closes automatically and without shock. This meter system eliminates human errors in compounding formulas. It's quicker and less costly than batch tanks or weigh scales . . . safer, since a closed metered piping system avoids the hazards of fumes and contamination. Available in stainless steel, bronze, steel or all-iron construction. Get full facts by writing Rockwell Manufacturing Company, Pittsburgh 8, Pa. Dept. 106K

Check 1684 opposite last page.

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CHEMICAL PROCESSING OCTOB

#### self-dumping hoppers

Illustrated bulletin of two pages describes line of self-dumping hoppers designed for industrial truck handling of wet or dry, cold or hot bulk materials to provide peak handling efficiency without undue operator fatigue. Self-dumping hopper Bul—Apex Welding & Fabricating Corp., Dept. CP, 30 Interstate St., Bedford, Ohio. Check 1685.

#### Viscosimeter catalog

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Bulletin of four pages discusses operation and use of instrument that continuously compensates fluid viscosity to a base or reference temperature over wide range of sampling temperatures. Cat.15A100—Fischer & Porter Co., Dept. CP, 40 Jacksonville Rd., Hatboro, Pa. Check 1686.

#### **Vibrating screen**

Features of 3600-vibrationsper-minute screen are discussed and illustrated in fourpage bulletin. Specifications are noted, and table lists dimensions for various models. Vibrating screen bul — Derrick Manufacturing Company, Dept. CP, 590 Duke Rd, Buffalo 25, N.Y. Check 1687.

#### Describes styrene plant

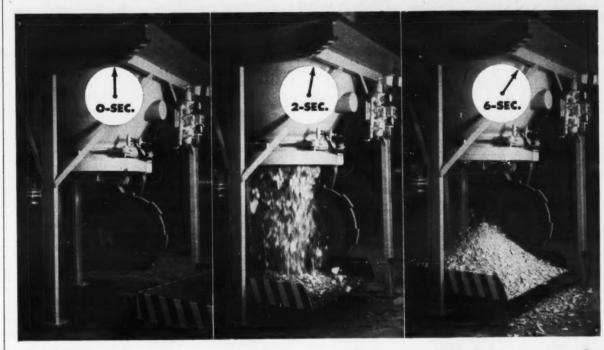
Booklet of eight pages illustrates and describes construction of styrene plant. Plant is first of its kind to use process which recovers ethylbenzene directly from gasoline. Styrene Plant booklet—Badger Mfg. Co., 230 Bent St., Cambridge, Mass. Check 1688.

#### **Guaranteed** mixing results

How mixing results can be guaranteed for any process requirements, according to company's procedure for selecting its side-entering agitators, is featured in eight-page bulletin. Agitator Bul — Industrial Process Engineers, 8 Lister Ave., Newark 5, N.J.

Check 1688A opp. last page.

# Here's what MODERN FILTERS can do!



# Just flip the lid...WHAM...cake removed in seconds

It's just as easy as that... why put up with costly downtime and messy operations when Industrial has the answer to **rapid thorough cleaning** in seconds. Industrial's new Vertical, Bottom Outlet, Type "152" Filter offers tremendous advantage in removing and subsequent disposing of waste materials.

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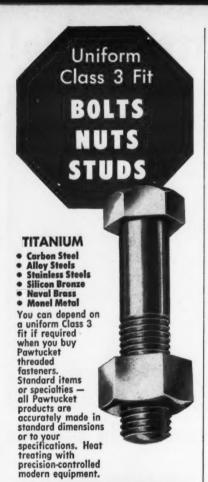
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Check 1689 opposite last page.







327 Pine Street Pawtucket, Rhode Island

Check 1690 opposite last page.

#### **NEW LITERATURE**

#### Mixing from top

Manufacturer's top-entering, propeller-type mixers for handling viscosities up to 5000 centipoises are fully described. Dimensions, specifications, and installation details are included. Bul 103-Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11, New York.

Check 1473 opposite last page.

#### Weighs and controls

Device for accurately, automatically, and continuously totalizing and feeding belt-conveyed dry material is detailed in four-page bulletin. Design features are described, and operation, dimensional data, and typical applications are shown. Bul 550-P5—Builders-Providence, Inc., Div. of B-I-F Industries, Inc., Dept. CP, 345 Harris Ave., Providence 1, R.I. Check

#### Analog, digital instruments

Manufacturer's short-form catalog of eight pages, details analog and digital instrumentation, including meters, scalers, recorders, and readouts. Analog computer with digital input and output is also described. Cat. C704-Berkeley Div., Beckman Instruments, Inc., Dept. CP, 2200 Wright Ave., Richmond 3, Calif. Check 1692.

#### Describes fume hoods

Bulletin of two pages details closed-type fume hoods and accessories. Equipment is illustrated and prices quoted. Fume Hood Bul—Arthur S. LaPine & Company. Dept. CP, 6001 S. Knox Ave., Chicago 29, Ill. Check 1693.

#### Radiation processing

Bulletin of six pages illustrates and describes company's high voltage radiation processing facilities, equipment, and methods. Bul F — High Voltage Engineering Corporation, Dept. CP, Burlington, Mass. Check 1694.

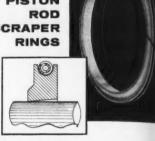
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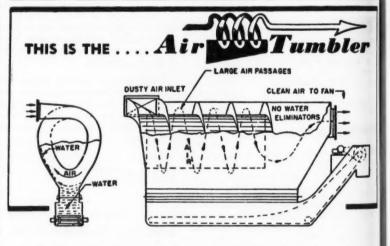
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Check 1698 opposite last page.

**NEW LITERATURE** 

#### Speedy box car loader

Operation of aluminum box car loader is shown in fourpage bulletin which points up features of manufacturer's equipment for loading sacks in box cars in less time than conventional operations require. Loader Bul — Ottumwa Box Car Loader Co., Dept. CP, Ottumwa, Iowa. Check 1699.

#### Atomic energy story

Companies role in development of atomic energy in wartime is described in 36-page illustrated booklet. Activities in peacetime applications of nuclear power are also out-lined. "Engineering for Atom-ic Power"—Stone & Webster Engineering Corp., Dept. CP, 49 Federal St., Boston, Mass. Check 1700.

#### Industrial truck line

Four-color catalog of 16 pages describes and illustrates manufacturer's line of fork-lift trucks, powered hand trucks, straddle carriers, and towing tractors. Specifications are given for all models. Cat. TC-94-Industrial Truck Div., Clark Equipment Co., Dept. CP, Battle Creek, Mich. Check

#### Features valve line

Catalog of 16 pages featuring manufacturer's line of valves also contains driers, strainers, and accessories for refrigeration, air conditioning, and in-dustrial applications. Cat. 102 — Henry Valve Company, Dept. CP, 3215 North Ave., Melrose Park, Ill. Check 1702.

#### For laboratory mixing

Manufacturer's equipment for handling practically any laboratory-scale fluid-mixing job for small-batch mixing is covered in bulletin. Specifications, list of accessories, and prices are included. Bul 112-Mixing Equipment Co., Inc., 185-K Mt. Read Blvd., Rochester 11. New York.

Check 1473 opposite last page.



Sound Engineering 721 East Park Avenue, Libertyville, Illinois Dallas, Texas

Check 1703 opposite last page.

# Now...the Marsh Needle Valve in 416 Stainless Steel

All the superior dependability of the Marsh Needle Valve . . . with all the corrosion resistance and durability of 416 Stainless Steel! Guaranteed for working pressure up to 10,000 psi; equally efficient at any lower pressure. Globe and angle patterns with double female connections in 1/8" to 1" size range. Also globe and angle valves with male inlet, female outlet, ¼" and ½" sizes.

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Marsh Instrument & Valve Co. (Can.) Ltd., 8407 103rd St., Edmonton, Alta., Can.

Check 1704 opposite last page.



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Check 1705 opposite last page.

#### **Product Research**

Starts on page 32

to be rated *very poor* in this factor. This will be especially true if style changes could leave the company with obsolete inventories.

Freedom from seasonal fluctuations: The product that rates very good on this factor is one that can be made, stocked and sold at a steady rate all year round. The rating must be lowered as seasonality creeps in, particularly if the off seasons coincide with off seasons of other products made in the same plant or sold through the same channels.

#### Position factors

The company's position in the industry is of prime importance when considering production of a new product or product line.

Time required to become established: Our position is more secure if we can complete our development work, build our facilities and become established before there is any serious change in economic, technological or competitive conditions. The new product which can be commercialized most rapidly therefore rates very good on this factor, whereas the one which has a longer, more difficult development period ahead must be rated very poor.

Value added by in-company processing: Our position is more secure, and the new product's rating on this factor will be higher, if we handle the entire processing rather than act merely as a convertor at one step.

Exclusive or favored purchasing position: If we can absorb the entire output of a scarce and particularly advantageous raw or intermediate material that is produced by a highly reliable contract source, our position is more secure than if a competitor has access to the same material.

Improved purchasing position: If the new product's commercialization steps up our purchase of certain materials into the carload a tank car class, or enables u to contract more favorably for raw materials, a very gool or good rating is assigned this factor.

Availability of raw materials within the company. This factor rates a very good or good mark if a raw material for the proposed product is already made or can be made elsewhere within the company.

## Research and development factors

Research and development factors figure heavily in evaluation of new ventures.

Utilization of existing knowledge: The less uncharted territory to be explored in the laboratory, the more chances of success, and the better the rating for the factor.

Relationship to future development activities: A project which is closely related to the main lines of the company's future activities and which will broaden the know-how fundamental to those activities will receive a far better rating than one which takes us down a side street.

Utilization of existing laboratory or pilot plant equipment: This saves time and money and is worth a high rating. The necessity for constructing new research facilities or acquiring and learning to operate large amounts of new equipment swings the rating towards the unfavorable side.

Availability of research and development personnel: The unavailability of the right talent within the company and the difficulty of locating it outside (unless it can be obtained by farming out research to university or consultant laboratories) is a factor to be weighed carefully and rated accordingly.

#### **Engineering factors**

Engineering on a new project can make the difference between success and failure. Three factors are considered when a new project comes up

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before the Polymer Division management.

Reliability of process knowhow: Many a new project runs well over its original cost estimate because the difficulties of developing an as yet untried process step were underestimated.

Utilization of standardized equipment: If the available process data indicate that standard equipment will fit the process, the risk is reduced and the rating for this factor can be a high one.

Availability of engineering personnel: The same considerations which were rated in the case of research and development personnel are also applicable.

#### **Production factors**

Problems likely to be encountered when the new product gets to the production stage are all examined.

Utilization of idle equipment: The advantages of this possibility are obvious.

Utilization of surplus steam, electric and water capacities: The surplus utilities should be reviewed as to possible other future demands on them, and if truly surplus, should be considered a strong plus value in rating the new product on this factor. If, on the other hand, the new product would only fit into a plant where expansion of water supply, for instance, would be very expansive, it would receive a rating of very poor on this factor.

Utilization and upgrading of by-products: There is an obvious advantage if this possibility exists.

Utilization of processes already familiar to company personnel: The high cost of additional training in new processes warrants a poor or very poor rating.

Availability of production and maintenance workers: If the new product is being considered for manufacture at an existing plant, quantity of labor available and new categories of jobs required should be weighed and rated.

Freedom from hazardous operating conditions, difficult maintenance requirements,

and waste disposal problems: All three of these factors will be estimated quantitatively when the operating costs are projected, but they also deserve a qualitative appraisal during the screening process.

The total profile for the new product idea covers 39 factors. If an idea shows a good profile, we are then ready to do further work on it. Thus we can concentrate our attention on the ideas that have survived this screening, without diluting our efforts by pursuing lengthy studies on those that should be discarded or put onto a reserve shelf.

In order to reach sound decisions based on all the factors to be considered, a company must develop a new product planning team composed of men from every phase of its organization. This team should have adequate staffs available to help attack all the factors that may lead to vulnerability in the planning operation.

When the team is well coordinated, sounder decisions will be reached, and management will have confidence in them. Experience has shown, too, that these decisions can usually be arrived at faster, once the group learns to function as a team. This enables the company to get on the market faster, which, in turn, helps assure a position of leadership.

Qualitative screening procedures are important, and quantitative profitability analyses are essential, but most vital of all is keen judgment exercised at every step in the selection of new projects by all the talent available, organized as a team.

#### READER COMMENTS WELCOMED-

Perhaps you have some opinions on the subject of product research, along with some wellthought-out ideas. If so, we would like to hear from you. Write to:

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- Ashcolite Pipe and Couplings for Hydraulic and Pneumatic Systems (Data Sheet Wa)
- Ashcolite Integral Wear-Back Fittings for Hydraulic Systems (Data Sheet Wc)
- Impact Fittings for Pneumatic Systems (Data Sheet Wb)
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MATERIALS HANDLING EQUIPMENT

Check 1706 opposite last page.

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Check 1707 opposite last page.

#### Financing Education

Starts on page 36

ing income would be turned over to the National Science Foundation for scholarships and fellowships.

In 1950, Congress established the National Science Foundation and empowered it to award scholarships and graduate fellowships for scientific study, or scientific work in the mathematical, physical, medical, biological, engineering, and other sciences at accredited institutions of learning. All of these are educational fields in which we are lagging behind. Currently, the Foundation is budgeting at the rate of \$3 million per fiscal year for scholarships and fellowships. Bill S727 would provide an additional sum of approximately \$3 million without the necessity of further appropriations.

Because of the limitation of funds, the legislation would give priority in granting these scholarships and fellowships to children of veterans of both World Wars and the Korean conflict, after which scholarships would be available for all US citizens. The Foundation would operate under existing law, and select the students on a basis of ability, with safeguards as to citizenship, loyalty, and with wide distribution among the States and Territories, just as it does today. Scholarships and fellowships for the teaching of such sciences would also be provided for.

Under existing law, the

#### CHEMICAL PROCESS-

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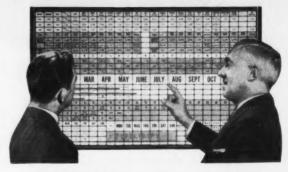
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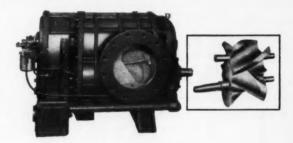
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Electro-deposited in pure copper, pure nickel, or nickle-on-copper. Most popular specification, nickel-on-copper can be furnished in lengths up to 100 ft. and widths up to 36" in the following counts — 25, 40, 65, 80 and 100. Nickel-on-copper, as well as pure copper and pure nickel can be furnished in counts ranging from 25 up to 400, but in relatively small size pieces. Write for details. Tolerances on hole size and thickness suitable for the most critical use. LEKTROMESH is ideal for precise filtration, for fabricated products such as fuel filters and electronic shields. For full details let us send our Bulletin on LEKTROMESH. Address Department 27.

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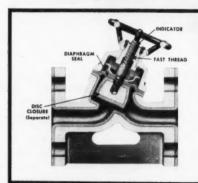


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Self-draining in horizontal position.

position.

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Automatic control available.
Body of any metal or with any

lining.
• Sizes 1/2" to 6".

W. S. ROCKWELL COMPANY - 2207 Eliot St., Fairfield, Conn.

Check 1714 opposite last page.

#### Financing Education

Starts on page 36

Obviously, the source of funds I propose for Bill S727 - one which I again emphasize does not cost the taxpayer one red cent in new appropriations - is not large enough now to finance a program capable of encompassing every child able to meet the requirements. Nor, at this moment, is it certain just how large this program should be. However, I firmly believe this proposal offers a means by which a start can be made; by which, in the words of Dr. Teller, the Russian's existing advantage in educational "lead-time" can be cut down.

As the program moves along, I, for one, am willing to experiment and to adapt it to the conditions which it will discover. I am willing to accept all honestly offered, genuinely constructive criticism and to cooperate in improving it in every way possible.

Aside from the national defense aspect, the skills in the fields will be utilized to the benefit of our future economic well-being, giving us higher standards of living and a continuous expanding economy. The peaceful use of these



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Our thanks to F. Slawek, Wyeth Labs., Inc., West Chester, Pa. THERMOCOUPLE WIRE ... it's SERV-RITE

Uniform calibration year after year is an important bonus realized with SERV-RITE thermocouple wire. Gordon has insured this unusual accuracy by the most careful advance selection of all bare wire stock to close thermocouple specifications. From a very large stock of bare wire, wires are matched to have a minimum departure from the standard curve.

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CHEMICAL PROCESSING

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needed skills will provide us with a long reign of prosperity and make it possible for America to maintain its competitive position in the markets of the world. Under this legislation we can enrich our nation's knowledge and strengthen our capabilities, and do this without creating any additional drain on our Treasury.

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As a matter of fact, utilization of these funds in this manner will result in saving the taxpayer about \$1 billion, which it would cost him for the procedures involved in returning the property to its former owners. These vested properties legally and morally belong to the United States. The principal should be used to pay legitimate American war damage claims. The balance should be maintained in a continuing fund to be invested toward helping educate the youth of our nation in the fields of engineering and science.

The money is available; the government machinery for operating the program is in existence. The need is great and immediate. All that is necessary now is action by the Congress.

#### Our Atomic Future

Starts on page 52

to do this, we shall consider only the isotopes that are produced by the atomic pile.

The AEC has had a great deal of experience with atomic piles and we know that we can produce neutrons at about \$7 per milligram. A portion of this is reserved for chemical separation costs for products produced. About \$4 is the cost of a milligram of neutrons absorbed and about \$3 per milligram are spent for chemical separation of the product.

For fission products, the only cost is separation cost. This is very difficult to estimate but we might as a rough rule say that general chemical separation costs will amount to about \$3 per milli-

gram of neutrons absorbed in fissioning the primary fuel atoms.

In other words, we will take \$3 per milligram of neutrons as a sort of overall chemical separation cost figure and apply it to fission products. We must realize, however, that krypton-85, for example, should be much cheaper to separate than something like strontium-90, which involves chemical reagents. Krypton-85, being a noble gas, will be removed simply by dissolving the fuel elements and degassing. By using this crude formula we can prepare a table of "rock-bottom" prices of isotopes (see accompanying table).

It is clear from the table that the present selling prices far exceed in nearly every case, except tritium, the rock-bottom price. The Commission operates on the basis of overall recovery of costs in the isotopes program which allows the large-volume isotopes to carry the cost for the low-volume isotopes, so that the individual isotope does not reflect the true cost in each case.

The cost of producing radioisotopes is something like an inverse function of the volume of sales and will drop very steeply as the result of an expanded radioisotope program. In many instances the potential uses of isotopes are so large that it makes some sense to consider the prices listed in the table as possibly practical and realistic and useful to rule out potential uses where the costs will always be prohibitive.

#### Regulations Revised

To the extent consistent with public health and safety, AEC regulations pertaining to the possession and use of radioisotopes have been revised and simplified to facilitate use of radioisotopes for industrial and other purposes. Quantities of radioisotopes which may be possessed under general authorization or license have been increased. Provision has also been made for distribution by manufacturers of sev-

Turn to next page

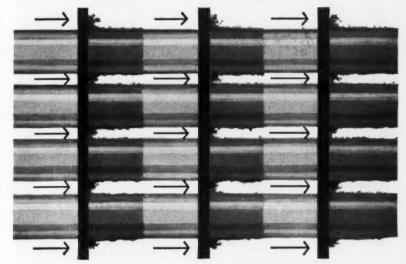
# How a Paracoil "clean shave" gives you better heat transfer

Back and forth go the baffles ... like blades ... along the tube surfaces .. shaving away accumulations of fouling materials . . cleaning the heat exchanger ... and giving process plants continuous, increased and better heat transfer.

This is the unique and principal feature of the Paracoil Self-Cleaning Heat Exchanger. Engineered with movable baffles, operated manually or by timed and automatic motor drive, stationary tubes are scraped and "shaved" free of fouling materials which are then carried away in the liquid.

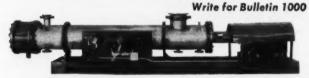
The Paracoil Self-Cleaning Heat Exchanger eliminates the need to stop processing for cleaning purposes.

If you have a fouled heat exchanger problem, we may have the answer.



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Below: Paracoil Vegetable Oil Chiller for converting a batch process to continuous cycle operation. Constructed of stainless steel and with an automatically timed, self-operating, self cleaning baffle assembly. The unit is presently improving product quality and rate of production in a vegetable oil processing plant.

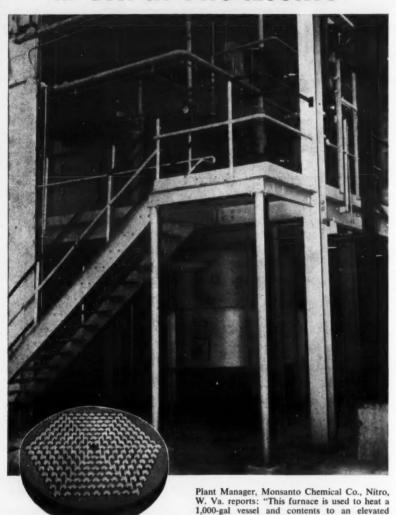


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Check 1716 opposite last page.

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## ...with Selas Duradiant® Heating

Control in uniformity of heat application and adherence to critical programming requirements are important features of Selas Duradiant heating for batch cooking chemicals, oils, resins, varnishes, inks.

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temperature and to maintain this temperature

for a predetermined period of time

Efficient, low-cost Duradiant enclosed or open settings are steelencased, shipped with all refractory in place for simple installation. "Packaged" equipment may include shopassembled piping and complete, automatic control instrumentation.

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Check 1717 opposite last page.

#### Our Atomic Future

Starts on page 52,

eral devices employing radioisotopes without specific licensing of their customers.

To facilitate licensing procedure for applicants, the application form for isotope licenses has been extensively revised to reflect more fully the information required in current licensing practice.

Production is also being boosted to meet increased demands. As an example, provision has been made for the production of cobalt-60 at Savannah River at rate of 200,000 curies per year through December 31, 1957. This material, together with that produced in other AEC reactors, will increase availability of this product for civilian use in 1957 to a minimum of 300. 000 curies.

There are many potential large scale uses for radioisotopes and radiation that a yet have not made their pearance. Those presently in use are paying a fair return on the entire capital investment in our atomic energy program. We look forward with complete confidence to the day when the applications of radioisotopes and the rapidly developing prospects for nuclear power will become a integral part of our daily lives.

(Based on talk given at opening of Nuclear Division Plant of The Beryllium Corp., Hazleton, Pa.)

#### A Strong Research Program

Starts on page 40

two parts - Technical Appraisal and Economic Appraisal. The first covers objective, planned approach, patent situation, outside know-how, likelihood of technical success, and others. Economic Appraisal is divided into costs and investment required, plus compatability with existing operations and product lines. The second phase of the Economic Appraisal involves market aspects.

At an early stage of a research project it is impossible to answer many of these questions with any degree of precision. However, these same questions will be repeated at further check points along the way. Once project investment mounts and subsequent decisions foretell still greater expenditures, a corresponding increase in the quality of answers should be demanded.

From the total of the proposals submitted, the research director will select the more promising in firming up a recommended program. The surplus goes to a hold file. The research program, comprising the proposals approved by the research director, can then go to a Research and Development Committee for review. The character of the Committee should be advisory, reporting to the company chief. Composed of top management people, the Committee should reflect adequately the major corporate functions.

#### Evaluation

Stage three - evaluation, followed by major laboratory effort - is possible when the project has developed appreciable meat on its bones. There should be few unanswered questions. Answers given should be concise and factual. The Committee will not need much intuitive ressoning but can be guided by facts and figures.

If the evaluation answer is "yes", the project moves into major laboratory and benchscale pilot studies. Scale of operation now increases and team of researchers may assigned to the task.

Toward the end of the evaluation stage, process development engineers will begin study all phases of the process for product being developed

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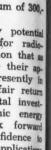
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- Completely Interchangeable with Packing
- Simple in Design—Only 8
- Chempro Teflon\* Shaft Packing—Chemically Inert
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- Parts Interchangeable Between Seal Styles
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Check 1718 opposite last page.

At the appropriate time, the prospectus once again should go to the R & D Committee for final consideration.

#### Shifting the Product to Production

Once the verdict is reached to move the project from research to process development, the major responsibility shifts. This early transfer of research developments to a group of skilled engineers has many advantages: The research department can concentrate on research; larger-scale pilot plants are unnecessary in the research laboratory; engineering and production personnel will strongly impress their practical skills in obtaining a final process or product producing maximum economic return. Bringing process development engineers into conduct of pilot work, aids and improves the existing processes and products. Tremendous profits are possible from studied attention to plant problems.

#### Commercialization

Often the decision to consider authorization for a fullscale plant will require the expenditure of many millions of dollars. Yet it is often the easiest to make. Facts are clear

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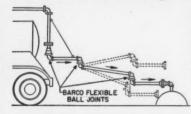






Check 1719 opposite last page.

# For SAFETY and Lower Costs in Handling Sulfuric Acid



The accompanying sketch shows how three Barco Ball Joints in unloading (or loading) line provide complete flexibility for making connections in any position. Note how line folds neatly on back of truck when not in use (photo below).





## **Barco Flexible Ball Joints** Replace Hose

Two near-accidents with hose blowing out some time ago, while handling sulfuric acid with 30 psi air pressure, caused Rogers Cartage Co. of Chicago to change to Barco Flexible Ball Joints (with malleable iron casing and stainless steel ball) in loading lines on some 15 big trucks serving many chemical, petroleum, steel, and other customers in the Midwest area. Since making the change, Mr. Jack Kidder, Rogers Safety Manager reports that there have been no failures and little or no maintenance on the joints. Cost for frequent hose replacement has been eliminated. Inquiries are invited, address Barco. Ask for Catalog 215B.

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NO METAL-TO-METAL CONTACT BETWEEN MOVING PARTS — No ball bearings to corrode.

CHEMICALLY INERT GASKETS No. 11-CT for corrosive service. Suitable for many liquid chemicals.

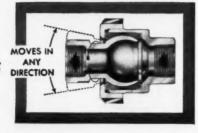
PRESSURE-SAFE! FIRE-PROOF! - Unequalled for SAFETY, DURABILITY, ECONOMY.

CHOICE OF STYLES — Angle or straight, Sizes 1/4" to 6". Available in choice of metals, including stainless steel and special alloys.

APPROVED - By leading chemical man-ufacturers and trucking associations.



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Check 1720 opposite last page.

#### Strong Research Program

Starts on page 40

so that uncertainty has reached the vanishing point.

Though the research department is represented at this historic meeting, its presence is mainly one of permitting a proud parent to see his offspring graduate.

It would be nice if this narrative could be ended by relating that our product lived happily ever after. However, this can never be. Even as the plant goes on stream, somebody somewhere is pondering an idea which will make our product or process obsolete However, realizing the long road we traveled in bringing our brain-child to maturity, it is reasonable to hope that research, development, and plant costs will be paid off with profits to spare by the time an improved product hits the market. Better still, if we are on our toes, we can be the ones to bring out the improved product. (Taken from a talk presented at Stanford Research Institute's Industrial Economic Conference, Sun Francisco, Calif.)

R

#### Industrial Psychiatry Starts on page 46

step in and find out what is happening to create this situation.

Very often the fault lies in the field of communications. Problems are not discussed freely between superior and subordinate. Praise often is not given for work well done. In one plant I talked to a man who complained of his inability to make decisions. He said, "If I could just be like my supervisor. He is so wonderfully poised. He is sure of himself and knows just exactly what he is going to say." This man was suffering tensions and doubt because of poor understanding between him and the boss. As a matter of fact his supervisor told me, "My young assistant is smart, sure of himself, speaks up, and holds his own.

These men, speaking freely to the psychiatrist, expressed their feelings. But recognition of the assistant's ability should have been communicated in their everyday working relationship. The psychiatrist can bridge this gap in communications and help restore proper working emotional balance.

Sometimes a supervisor will come to me and say, "I have a man working for me who I think would do well in a position above his present level. He has certain personal qualities which I feel must be overcome before he can handle a new job. Can you help him overcome these?"

First of all, we discuss whether the man knows that he has these qualities. Has the supervisor ever discussed it with him? All too frequently, because "I didn't want to hurt his feelings," nothing has been said. Often, a good talk with the supervisor will straighten it out and he will realize that small unkindnesses are far kinder than a policy of saying nothing. If necessary, and the man is willing to cooperate, he can come to see me and we can frequently change the factors which have been disturbing him, and make him available for better work and better jobs.

Industry usually hires peo ple because of proven skills in certain areas, i.e. a Ph.D. chemist for bench work. This degree does not mean that he will be able as an administrator of people.

We bring our children up to use the right words, to place them in proper phrases, and to be polite. Because our supervisors are fundamentally very nice people who do not want to be unkind, they hesitate to tell an employee when he is doing something wrong A talk with the psychiatrist can open up these blocked areas of communication and help maintain emotional harmony within departments.

Frequently it will be a reorganization which he aroused anxiety. Sometimes will be orders which have best

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#### HARDINGE REGULATING FEEDERS



**Constant-Weight Feeders** 



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The Hardinge line of regulating feeders provides a rugged and trouble-free feeder unit for every type of dry, flowing material. The Constant-Weight Feeder, in particular, is excellent for control by weight, rather than volume, of materials which vary in size or density. Write for Bulletin 33-E-13. State your feeding problem.

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given without adequate explanation. Or it is the personality of the supervisor himself, if he has become tense and unhappy either from treatment he has received or im-

agined he received in his job or at home. If the psychiatrist is retained on a regular basis, plant people get to know he is there. As they learn to trust him as a person his availability minimizes these areas of anxiety. There is a certain amount of prevention of psychological problems for all employees in the plant. Of course, ideally, most of these anxiety-promoting situations could be eliminated or minimized by the supervisor. But it takes a rare type of individuals to do everything right especially when sensitive

volved. Without training in psychology, it is extremely difficult to know the right answer in all such situations. Even with this training no one knows all the answers.

psychological factors are in-

After a psychiatrist has been employed, there is a gradual increase in the number of recognized individual and group emotional problems. What had been previously covered up is brought out into the open. "We never had these problems before we had a psychiatrist" is often heard. Actually this is not true. The problems just were not recognized before.

#### What Psychiatry Will Not Do

Many companies have hopes that the psychiatrist can tell them who should be promoted and how far they can be expected to advance. Many psychologists promise this, but unfortunately have never been able to find any way of validating their work.

I have investigated the area of preemployment tests over a period of years and have found that none is particularly valid. With men who have been working in industry, an honest evaluation of past work is far more accurate than a test. I continue to do some testing, and to be constantly aware of what is going on in this field. Unfortunate-

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# E-D Filter Paper Makes Excellent Cover For Cloth Or Other Filter Media

## Provides Greater Clarity Of Filtration And Prolongs Life Of Filter Medium

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Actual experience, in hundreds of cases, has proven to the satisfaction of production officials that it is far more economical to cover the cloth or other filter medium with E-D filter paper and then, when the press needs redressing, to simply peel off the paper, discard it, and replace with a clean E-D filter paper cover. Substantial savings in press running time are made.

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degrees of rapidity and porosity are available in the more than 50 regular grades manufactured by The Eaton-Dikeman Company. Special grades are also made to meet individual requirements.

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This company is the only company in America that is exclusively engaged in the manufacture of filter paper for science and industry. Authorized representatives and dealers are located in every section to provide service and helpful information on all problems relating to liquid filtration.

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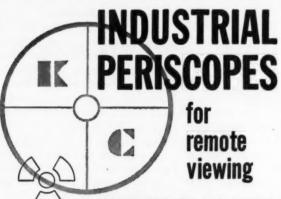
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Check 1724 opposite last page.

#### Industrial Psychiatry

Starts on page 46

ly, there is no valid test for motivations, and this is the most important aspect in an individual's desire to move ahead.

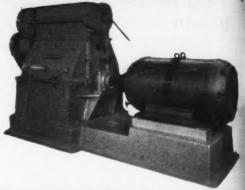
However, our entire knowledge is relatively new and there are many areas which are as yet unexplored. I can often have an opinion about an individual's ability to function under different circumstances, but this opinion, outside of a very gross way, will not apply to all of the vagaries that go into making up a man's shift to various jobs under different supervisors, and tensions at work and at home.

#### **Employee Acceptance**

The psychiatric program at Cyanamid was viewed with a certain amount of suspicion and even anxiety in its early stages. By the end of the first year a great many patients were self-referrals, rather than being referred by other physicians. In the beginning, people were fearful of having it known that they were seeing me, and occasionally were angry when I spoke to them in the halls. Within the first year, people became more re-



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chains, truck or freight car doors, and other uses where special shackle lengths are more desirable.





Corrosion resistant: cadmium rustproofed laminated steel; laminated brass case, solid brass shackles; stainless steel case on combination padlocks.

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Master Padlocks

Mester Jock Company, Milwaukee 45, Wis. World's Largest Padlock Manufacturers

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OCTOBER 1957

laxed about it. They even began asking to see me when they were in a crowd of people, many of whom they knew personally.

Goals of Industrial Psychiatry

Psychiatry in industry is essentially preventive, to keep employees from becoming emotionally disturbed enough to make lost job time necessary. The psychiatrist can suggest ways of improving communications between working levels so that anxiety-causing situations are reduced, lessening the dangers of emotional overload. He can reach the areas of an employee's home or community life which affect his working ability but which are usually "hands off" territory for supervisory personnel.

The goal of the industrial psychiatrist is not to eradicate all emotional imbalance or anxiety, for this would remove the drive which makes a man move ahead. Rather, he tries to maintain a level of function which is comfortable and most productive for the

individual.

A program of psychiatric health can be installed in any firm depending upon the desire of management to have such help. But a word of caution. If management plans to use him as a tool to get rid of people they no longer want, then there will be real difficulties.

CHEMICAL PROCESS-ING's Editors are always interested in the opinions of our readers. What are your views on the subjects we cover each month?

"Over The Reader's Shoulder" (page 22) will publish as many letters each month as is possible. Let us hear from you.



Fig. 3135 single stage paper stock pump. Centerline discharge and self-venting casing provide steady flow without binding. Nonclogging impeller with back wall ejector vanes. Handles slurries. Twelve sizes; capacities to 6400 GPM, heads to 215 ft.

Fig. 3138-39. Specially designed for heavy duty service, pumping corrosive or noncorrosive liquids, with or without solids in suspension. Vertically split casing, "back pull-out" design. Four sizes; capacities to 9000 GPM, heads to 160 ft.



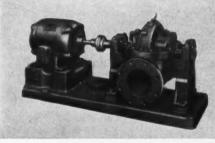


Fig. 3405 single-stage, doublesuction pump. All sizes and pump combinations based on only 3 shaft and bearing assembles, Mechanical seals or stuffing boxes. Rotation can be changed in field. Thirty-three sizes; capacities to 6400 GPM, heads to 425 ft.

# GET QUICK ANSWERS TO CORROSIVE PUMPING PROBLEMS

You can solve corrosive pumping problems quickly because a number of Goulds centrifugal pumps now come in a wide range of special metals.

You can get them with fluid ends in your choice of the special metals listed below. Just match the special metal to your pumping problem.

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All Iron
Bronze Fitted
Nickel Aluminum Bronze
Steel and Steel Alloys

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You can keep spare parts inventory low, and meet quick changes in process requirements because Goulds pumps are designed with standardized parts for easy interchange between sizes.

Bulletin 5252-J has brief descriptions of these pumps (and the Goulds-Pfaudler *glassed* pump). Write for a copy.

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### DENVER PROCESS EQUIPMENT

DENVER (patented) SUPER AGITATORS and MIXERS		3'x 3' to 20'x 20'	Patented standpipe around propeller shat assures positive agitation and circulation Patented wearing plate prevents sand-up or shut-down. Heavy duty as well as acid proof construction is available in both open type, air lift and Super Agitator models Please write for Bulletin No. A2-84.
DENVER Steel-Head BALL MILL		3'x 2' to 8'x 20'	A Denver Steel-Head Ball Mill will suit you particular need. Five types of discharge trun nions. All-steel construction. Low initial cos due to quantity production. Quick delivery Laboratory and pilot plant mills also avail able. Please write for Bulletin No. B2-813
DENVER Automatic SAMPLERS	P.L.	16" to 60" Cutter Travel	Heavy duty units, extra rigid track and ball bearing wheels assure positive travel and timing of sample cutter. Available in stain less steel for acid and corrosive service. We and dry cutters. Central Control Panel for multiple samplers. Bulletin. No. S1-34.
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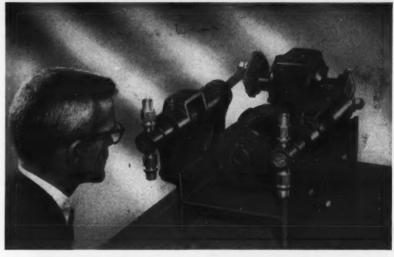
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\*DuPont's trade name for tetrafluoroethylene MAIL COUPON FOR FREE BROCHURE

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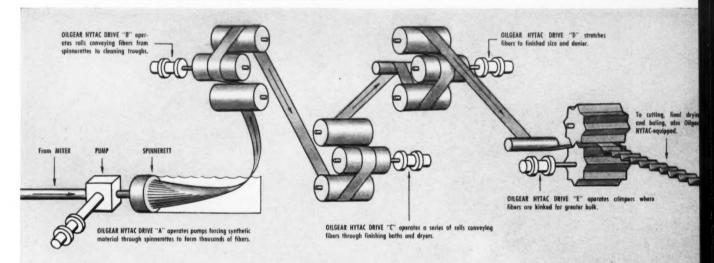
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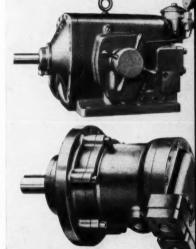
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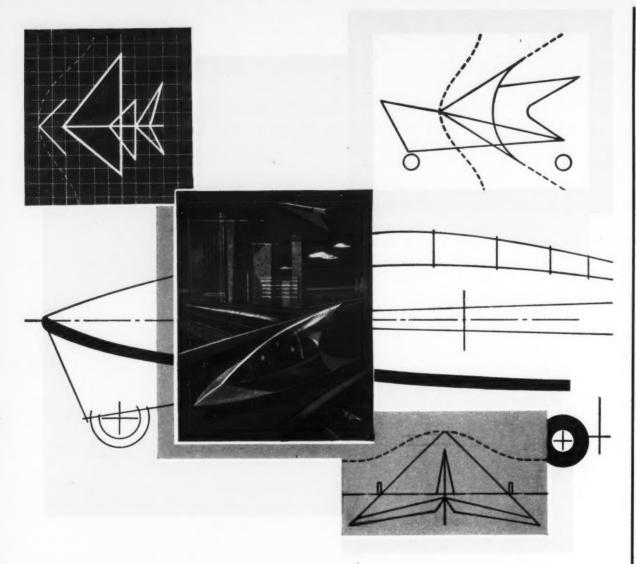
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